APRIL 1950

Plant Engineering

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Volume 4, No. 4 Circulation of this issue 28,901

The magazine that helps plant engineers with their everyday problems

JENKINS PRACTICAL PIPING LAYOUTS 49

Code	QUAN.	For Standard Industrial Installation	For Underwriters' Approved Installation	Service
A	1	Fig. 651	Fig. 925	Primary Water Supply Control
B	1	Fig. 715-A	Fig. 707	Auxiliary Water Supply
C	2	Fig. 293	Fig. 629	Prevent Water Loss or Backflow
D	3	Fig. 368	Fig. 275-U	Water Supply to Proportioners
E	1	Fig. 294	Fig. 628	Prevent Backflow to Chem. Storage Tank
F	3	Fig. 650	Fig. 824	Chemicals Supply to Diffuser
G	4	Fig. 651	Fig. 825	Distribution Shutoff
H	1	Fig. 715-A	Fig. 707	Hose Connection Infield
J	7	Fig. 106-A	Fig. 106-A	Drain
K	1	Fig. 106-A	Fig. 106-A	Pressure Gage Control

VALVE RECOMMENDATIONS
For details and valves to suit varying conditions see Jenkins Catalog

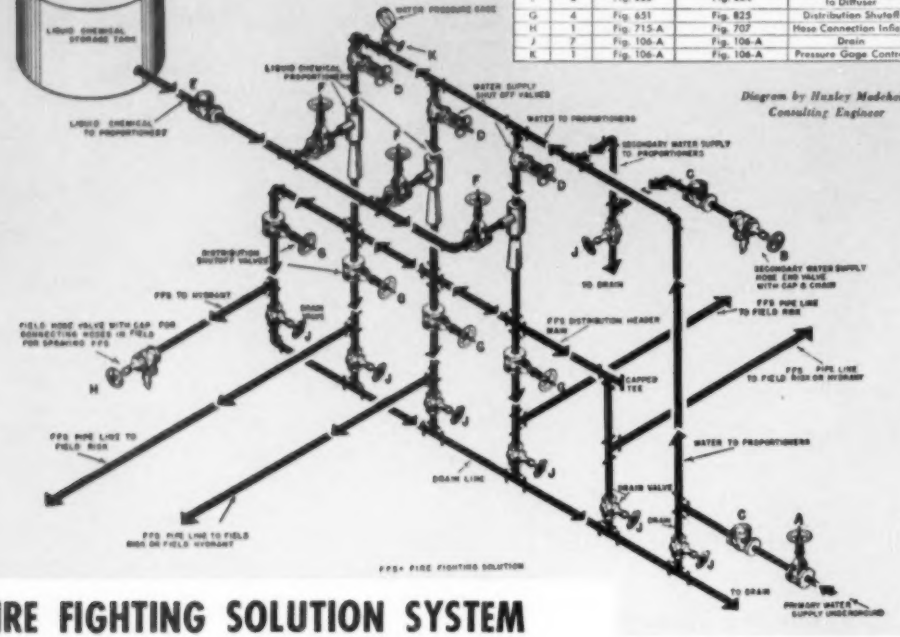
LIQUID CHEMICAL STORAGE TANK
WATER PRESSURE GAGE
LIQUID CHEMICAL PROPORTIONER
WATER SUPPLY SHUT OFF VALVES
LIQUID CHEMICAL TO PROPORTIONER
WATER TO PROPORTIONERS
SECONDARY WATER SUPPLY TO PROPORTIONERS
SECONDARY WATER SUPPLY HOSE END VALVE WITH CAP & CHAIN
DISTRIBUTION SHUTOFF VALVES
TO DRAIN
FPS TO HYDRANT
FPS PIPE LINE TO FIELD RISE
FIELD HOSE VALVE WITH CAP FOR CONNECTING HOSES IN FIELD FOR SPRAYING FPS
FPS DISTRIBUTION HEADER MAIN
CAPPED TEE
FPS PIPE LINE TO FIELD RISER OR HYDRANT
FPS PIPE LINE TO FIELD RISE
WATER TO PROPORTIONERS
DRAIN LINE
DRAIN VALVE
DRAIN
FPS PIPE LINE TO FIELD RISE OR FIELD HYDRANT
TO DRAIN
PRIMARY WATER SUPPLY UNDERGROUND
FPS= FIRE FIGHTING SOLUTION

Diagram by Huxley Madeheim Consulting Engineer

FIRE FIGHTING SOLUTION SYSTEM

The fire fighting system most frequently installed employs liquid chemical for the flame-smothering foam solution, as illustrated in the accompanying diagram.

When a fire occurs the primary water supply valve is opened, as are individual liquid chemical and water supply valves on the lines feeding the liquid chemical proportioners. As the water flows through the proportioners, it siphons chemical from the storage tank and mixes with it to form the foam.

Two sets of Jenkins Valves are recommended for the system shown here, one for standard industrial installations, the other for Underwriters' Approved Installations. The Fig. 715-A Bronze Fire Line Angle Valves used are approved by the Board of Standards and Appeals of the City of New York.

Consultation with accredited piping engineers and contractors is further recommended when planning any major piping installation.

A CHOICE OF OVER 500 VALVES

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the Jenkins Catalog. It's your best assurance of lowest cost in the long run, and *you pay no more* for Jenkins Valves despite their extra value. Jenkins Bros., 80 White St., New York 13; Jenkins Bros., Ltd., Montreal.

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Jenkins Bros.

How twin grommets reduce belt failures

B.F.Goodrich grommet V belts last 20 to 50% longer

WHEN an ordinary V belt enters the sheave, the center cords are forced down and away from the center where the load is carried. Belt men call this "dishing" because the cord section becomes concave like a dish. With the new B. F. Goodrich V belt there are no center cords, no "dishing." Here's how it works —

All cords are put to work — Twin grommets are placed close to the driving faces of the belt. All the time the belt is in the pulley, the grommets keep working close to the driving surfaces. The load is evenly distributed. In laboratory tests, grommet V belts actually lasted 20 to 50% longer.

Every part is flexible — Because a grommet V belt has no stiff overlapping section, every part is equally flexible. Better grip, less slip. Grommet V belts give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Endless grommets reduce belt failures — Most of the failures in ordinary belts occur where cords overlap. But in the B. F. Goodrich grommet V belt the cord section is *endless* — made by winding heavy cord on itself to form an endless loop. These are twin cord sections, *not ordinary cables.*

No other V belt has it — Twin grommet construction is found only in B. F. Goodrich V belts. (U. S. Patent No. 2,233,294.) It's a premium construction feature that costs you no more. At present made in D and E sections only. Ask your local B. F. Goodrich distributor to show you his "X-ray" belt that clearly illustrates grommet construction. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich

PLANT ENGINEERING

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Published Monthly by
TECHNICAL PUBLISHING CO.
53 W. JACKSON BLVD.
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Subscription Information — Published Monthly. Prices: United States and Possessions one year $10.00, Canada one year $11.00. Other countries one year $12.00. Single copies $1.00.

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'Round About with the Editors

Dust Counting— Unusual Occupation

IN CASE YOU think counting the grains of sand at the seashore is impossible, science recently unveiled an instrument that counts invisible particles in the air a million billion times smaller than a grain of sand.

The instrument doesn't even "pick 'em up and lay 'em down." It just looks at them, blinks an "eye" when they occur in the air being sampled by the instrument, and records the occurrence on paper.

The device was developed by Dr. Bernard Vonnegut, weather scientist in the General Electric Company's Research Laboratory at Schenectady, N. Y. The device will be used by Dr. Vonnegut and other weather scientists to study the behavior of particles in the atmosphere, determine how they disperse, find out how far they travel, etc.

Such knowledge will be useful in developing atmosphere-seeding techniques for a material called silver iodide, which in similar small particles form causes supercooled or below-freezing moisture to turn to snow.

The device also should prove useful in air pollution studies to trace the development and dissipation of various smokes from industrial centers, and populated areas, according to Vonnegut.

Particles the instrument detects are less than a millionth of an inch in diameter, and by comparison, a grain of sand weighs approximately one million billion times more.

Productive Power Show Goes On Road

PRODUCTIVE POWER, a traveling show to demonstrate how industry can do its work better, faster, and cheaper electrically, went on the road during February. Produced by Westinghouse Electric Corp., the show is sponsored by public utilities for their industrial customers in 125 cities throughout the United States. The first showing was in Akron, Ohio continuing until the final demonstrations are given on the Pacific Coast early in 1951.

The show starts with a graphic demonstration of the effects of wire size and circuit protection in factory distribution systems. Effects of low power factor and its correction by the use of capacitors are shown on an actual circuit carrying power. Lighting problems and how they affect production in the plant are discussed and demonstrated.

Effects of air pollution by smoke and dust on manufacturing processes are described and the use of electrostatic air cleaners is shown by a working model. The speed of infra-red heat for drying paint is compared with other methods. Three boards painted simultaneously before the audience are dried by forced air, by an electric strip heater, and by infra-red lamps. Only the board exposed to the infra-red lamps dries during the five-minute demonstration. Spot welding, furnace brazing and rf heating are demonstrated, too.

Columbia to Conduct Costs Conference

THE DEPARTMENT of Industrial Engineering of Columbia University, New York City, has announced that it will conduct a five-day conference on the Costs, Budgeting, and Economics of Industrial Research from June 12 through June 16 of this year. Experts from industry and the university will participate in lectures, discussions, and clinic sessions designed for the practical research and development administrator.

The conference is in addition to the regular evening course given in the administration of research and development, and is intended to supplement the work of the various groups and conferences already in the field and to provide practical material for the research executive and his assistants.

Additional information may be obtained by writing Prof. David Bendel Hertz, Department of Industrial Engineering, 409 Engineering, Columbia University, New York 27, New York.

Comic Books to Help Sell Safety

EBASCO SERVICES, INC., 2 Rector St., New York City, has announced publication of the first of a series of safety booklets, designed to tell the story of utility safety work to mass audiences through the use of the "comic book" technique.

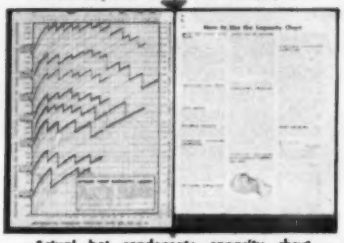
The first booklet, which has just come off the presses, is called "Danger Flies a Kite" and features with color cartoon one phase of the vast precautions needed in the electric utility field for the protection of the public as well as the industry's workers.

"You can engineer any trapping job with this book"

YOU CAN'T GO WRONG

Physical data and prices on all sizes and types of Armstrong steam traps.

How to calculate condensate loads and select traps for all classes of equipment.



Actual hot condensate capacity chart for every Armstrong trap, recommended safety factors and specific recommendations for many types of equipment.

THERE is no guess work about steam traps or steam trap selection when you have the 36-page Armstrong Steam Trap Book to work with. You don't waste money on traps that are too big for the job. You don't get inefficient drainage with traps that are too small.

This book explains the design, operation and advantages of Armstrong steam traps, specifies materials used, gives complete dimensional data, includes list prices, actual capacities under working conditions. There are 10 pages of tabular and technical data explaining how to calculate condensate loads and select the correct trap for the job, complete instructions on installation and maintenance. The Steam Trap Book also describes Armstrong traps for draining moisture from compressed air systems, Armstrong steam humidifiers for adding moisture to dry air and Armstrong non-condensable gas purgers for removing air from refrigeration systems.

Anyone is welcome to a copy of this useful guide to good trapping practice. Send for yours today.

ARMSTRONG MACHINE WORKS
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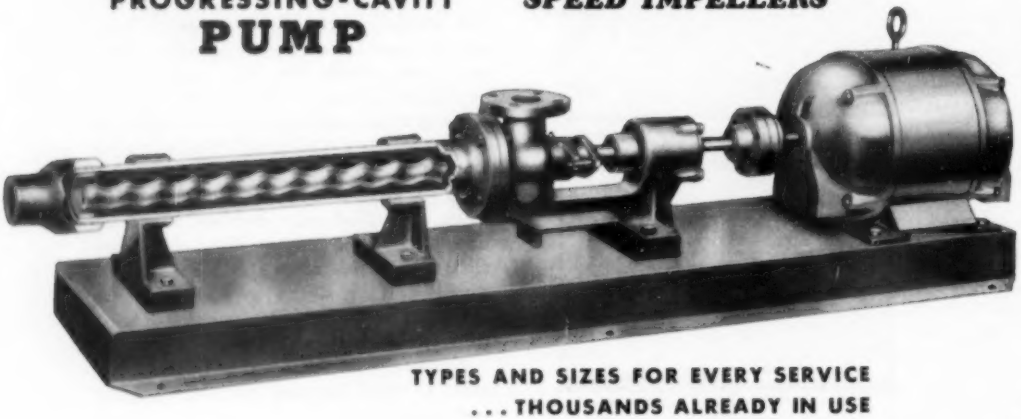
ARMSTRONG STEAM TRAPS

Want a REVERSIBLE PUMP?

It self-primes with nearly perfect suction vacuum . . . passes particles and solids in suspension . . . delivers positive pressures to 1000 p.s.i.—without pulsation . . . meters flow . . . resists chemicals, abrasives . . . stands up where other pumps have failed.

Get an R & M MOYNO® PROGRESSING-CAVITY PUMP

NO PISTONS TO STICK...
NO VALVES TO FOUL...
NO CHURNING HIGH-SPEED IMPELLERS



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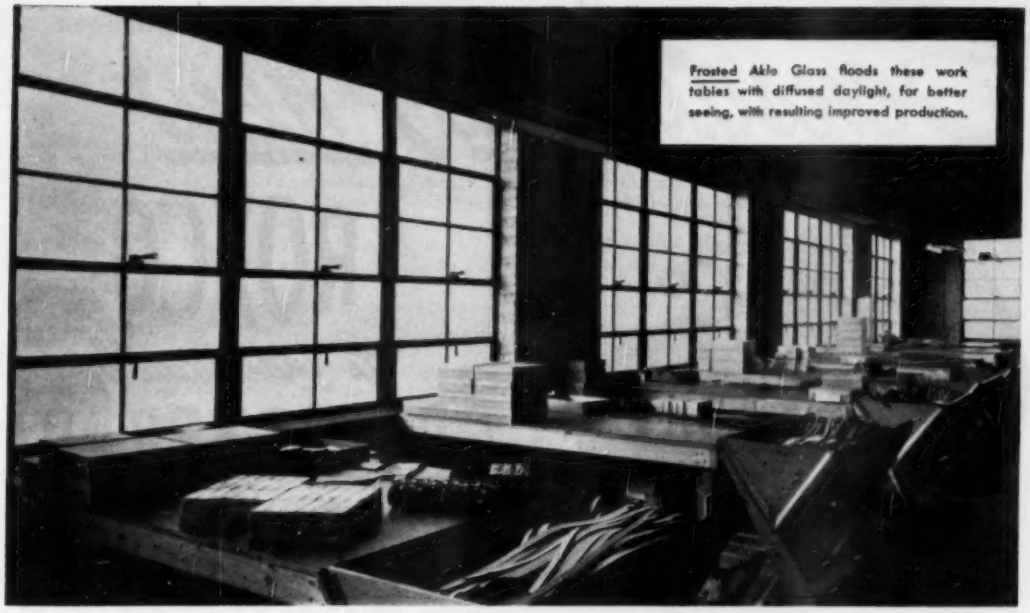

Frosted Aklo Glass floods these work tables with diffused daylight, for better seeing, with resulting improved production.

Production UP... Labor turnover DOWN with

FILTERED DAYLIGHT

That's the record at the Reliable Belt Company's Chicago plant where Blue Ridge Frosted *Aklo** Glass was installed in side walls and skylights for reduction of glare and sun heat.

Before the *Aklo* installation, roller shades were lowered to avoid glare. As a result artificial lighting was required even on sunny days. Here are some comments from the management on the success of filtered daylight through *Aklo* Glass:

- Increased production with fewer rejects because quality of light is better.
- Better attention to the job with less time out for rest periods because of eyestrain.
- Economy on artificial light and no more maintenance of shades.
- More comfort on hot days because *Aklo* retards sun heat.
- Happier employes and resulting lower turnover.

Whatever you make in your plant, these are benefits which can help you keep production costs down.

AKLO REDUCES GLARE. This blue-green diffusing filter between the sun or sky and the eyes of workers makes seeing more comfortable, less tiring.

RETARDS SUN HEAT. *Aklo* Glass absorbs nearly all the infrared radiation of the sun and re-radiates much of it externally. Interiors stay cooler. Load on air conditioning is decreased.

Aklo Glass is manufactured by the Blue Ridge Glass Corporation of Kingsport, Tenn., and sold through L·O·F Glass Distributors. Ask your distributor for a Radiometer demonstration, see for yourself how Frosted *Aklo* Glass reduces glare and sun heat. *®

Free Book on Reduction of Sun Glare and Heat. Write to Blue Ridge Sales Division, Libbey-Owens-Ford Glass Company, 9345 Nicholas Building, Toledo 3, Ohio.

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Heat Absorbing • Glare Reducing • Figured and Wire Glass

Sensational new

ROXCO

it's individually

REGISTERED

it's completely

GUARANTEED

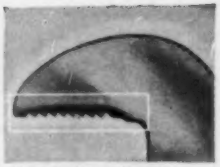
TRIMO-ALLOY WRENCH . . . Roxco's only Rival . . . an all alloy-steel heavy duty pipe wrench long famous for ruggedness. Different in design, but has power comparable to Roxco.

it's superiority for yourself!

SPECIAL MONEY-BACK TRIAL OFFER

Buy one "Registered" Roxco and use it for your toughest jobs. If you don't agree it stands up better . . . is handier, faster to use . . . is a bigger value than any pipe wrench you've ever used . . . return *that* one trial Roxco direct to us (not the seller), within sixty days with a note of price paid and reason for returning. We will refund your money. This get-acquainted offer good until Dec. 31, 1950. Trimont Mfg. Co., Roxbury, Mass.

"Registered" ROXCO ... First Pipe Wrench Engineered by Stress Analysis to Combine Maximum Strength with Minimum Weight



See dark Hardened area

Here, at last, is a pipe wrench that's a brute for strength, yet a beauty to handle.

No longer is there any need to tolerate useless weight in order to get dependable strength. Through stress analysis during design, useless metal that means tiring weight was engineered out of the new *Roxco*. Extra metal, exactly where needed for extra strength, was engineered in.

The lighter, handier, faster-working *Roxco* actually exceeds by a good margin the strength requirements of Federal Spec's. for Heavy Duty Pipe Wrenches, Type II, GGG-W-651a.

In many other ways, too, *Roxco* is the most practical pipe wrench ever known. Read all its superior features ... the ratcheting action that matches any man's speed ... the tough jaws with induction hardened teeth ... the unique reinforcing shoulder behind insert jaw ... and all the others. Get a trial *Roxco* ... judge it on the job. It's made in sizes 6" to 48". No gamble because every wrench is ...

Individually REGISTERED ... Completely GUARANTEED

Special design and quality control enable us to back the *Roxco* to the fullest extent. Every wrench is given its own serial number and fully guaranteed ... *every* part of it ... against breakage in any normal heavy duty use.

✓ Check these "engineered" features

1 Extra Strength Based on Stress Analysis: Extra metal at critical points provides much higher resistance to failure. Withstands unusual stress in "side pull".

2 Lighter Weight Achieved: Stress analysis showed where useless metal could be eliminated to produce a lighter, handier wrench.

3 Uniform Jaw Hardness and Strength: Both jaws are drop-forged alloy steel. Teeth are hardened by automatically-timed, localized induction process at wear points, yet tough core of jaws is retained for strength.

4 Reinforcing Shoulder Behind Insert Jaw resists unusual stress. Assures long, trouble-free service.

5 Rapid Ratcheting Action: New, simplified cushion action replaces complicated spring. With Roxco tooth design, it prevents seizure on pipe and permits fast ratcheting — as fast as user can move his hand. Accurate fit of parts saves lost motion—speeds jobs.

6 Comfort-Shaped, Palm-Fitting Handle: New wider, more comfortable handle — makes work easier, cuts worker fatigue.

7 Reinforced Housing embodies a hammer face to break cast fittings.

8 Handy, Accurate Pipe Scale permits quick adjustment to desired size.

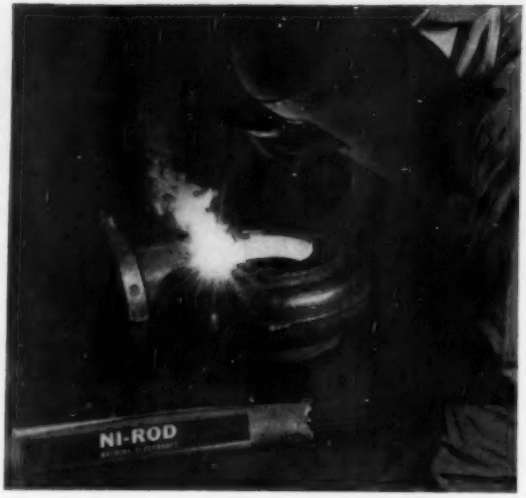
Special Metallurgical Formula: Roxco Metal, combined with scientific heat treating, means superior strength throughout.

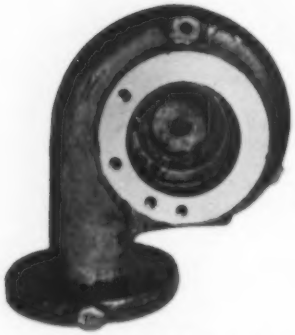
AMAZING TEST OF STRENGTH

4510 LBS. of automobile and rigging was suspended from the handle of a stock 24" ROXCO gripped on a steel shaft. No distortion when the load was removed—the wrench was 100% perfect throughout!

Rewarding work!

NI-ROD saves iron castings...makes *machinable* welds





But for Ni-Rod electrodes, this pump body would have been scrapped at the foundry. The built-up area of the flange facing is almost indistinguishable from the original cast iron. Machining, drilling and tapping of the Ni-Rod weld deposit were no more difficult than similar operations in cast iron.

In the photograph above, you see a 45-pound gray iron pump casing that was rejected because a small area of the flange failed to fill during pouring.

Instead of being scrapped, the casting was sent to the plant's welding department. There, with Ni-Rod® electrodes, the defective flange was built up and the repaired casting was passed to the machine shop where it was finished like a regular production piece.

Salvage operations like this with Ni-Rod save time and money.

Ni-Rod gives fast, crack-free, non-porous welds that are a close color match for gray iron . . . and welds that are as *machinable* as the iron itself. Slag removal is easy. And Ni-Rod is stable-arcing in all positions with either AC or DC current.

Another important Ni-Rod feature . . . preheating or post-heating is seldom necessary.

Why not try Ni-Rod in your own shop . . . soon? Discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they've tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

FREE — 8-page booklet:
"NI-ROD . . . a new electrode for any cast iron welding."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

For welds you've never been able to make before . . . in high-phosphorus irons, heavy sections—

NI-ROD "55"

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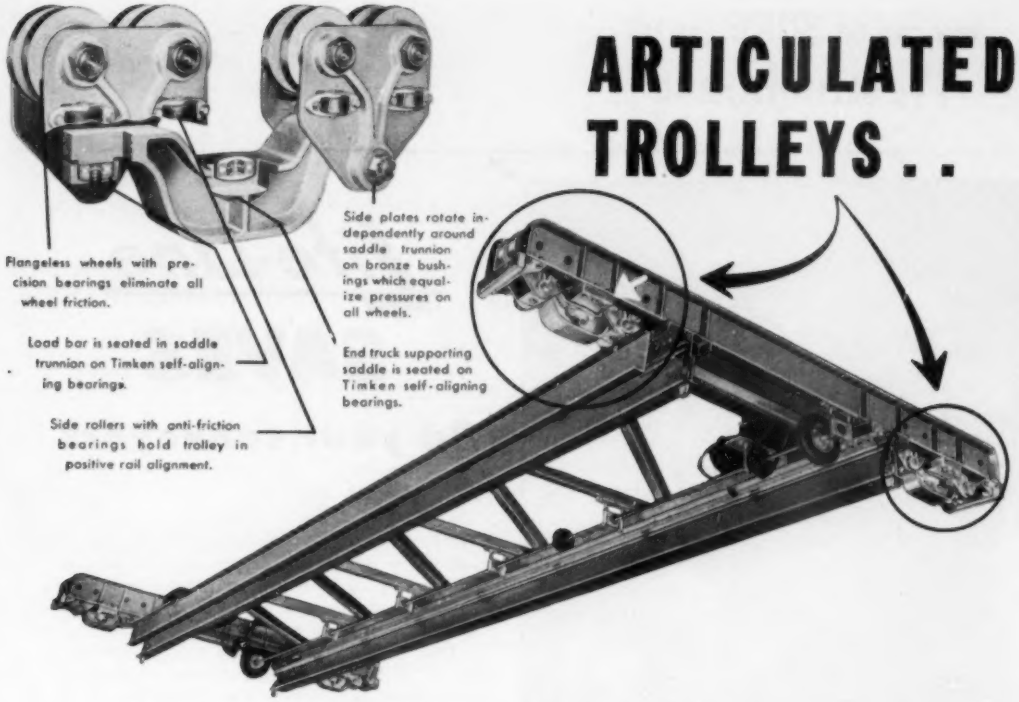
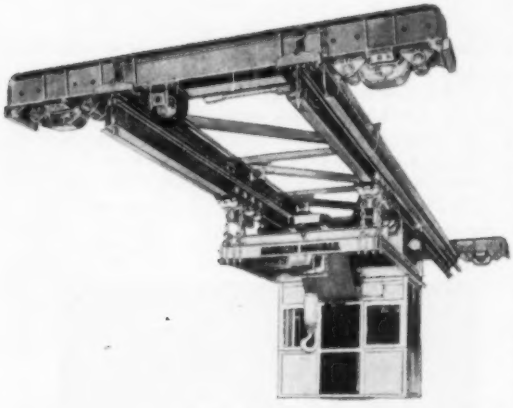
ARTICULATED TROLLEYS . .


Flangeless wheels with precision bearings eliminate all wheel friction.
Load bar is seated in saddle trunnion on Timken self-aligning bearings.
Side rollers with anti-friction bearings hold trolley in positive rail alignment.
Side plates rotate independently around saddle trunnion on bronze bushings which equalize pressures on all wheels.
End truck supporting saddle is seated on Timken self-aligning bearings.

makes possible High-Speed, Heavy-Service
AMERICAN MONORAIL CRANES



When each trolley wheel carries its share of the load in perfect alignment with the craneway tracks and all possible friction is eliminated, the result is perfectly articulated trolley travel.

Applied to American MonoRail Cranes, these articulated trolleys permit operating speeds of 500 feet per minute . . . constant service . . . handling loads up to 10 tons. And with this is offered all the flexibility of MonoRail design for *interlocking carrier service between and beyond the craneways.*

Let an American MonoRail Engineer explain all the advantages of these new cranes. Write for Bulletin MF-1 showing the development of American MonoRail Cranes for over-all plant service at low initial and operating costs.

THE AMERICAN MONORAIL COMPANY

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YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Life-Line SAVES

On your conveyors

The experience of this Philadelphia plant might well be yours. Maintenance costs of motors were moderate. Nevertheless, the plant operators were continually on the lookout for ways to cut costs. Sound familiar?

They found it in Life-Line motors. As they put it, "Life-Lines save the expense of constant lubrication. Formerly, it was necessary to have a special oiler do nothing but lubricate motors. Now, all this is eliminated. Life-Lines need no lubrication."

Unusual? No. Typical on Life-Line installations. Users all over the country say, "Life-Line motors save me money". An industry average indicates a yearly saving of $2.70 per motor from lubrication alone.

Think what it costs to lubricate motors on your conveyors and other equipment. That's money you can save . . . money you can deduct from your operating expense account.

Isn't this saving worth getting? You get it with Life-Lines at no extra cost. Ask your Westinghouse representative for a copy of Motor Costs, B-4321, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-21584

—— If you figure LIFE-COSTS . . you'll figure LIFE-LINE ——

ERIEZ MAGNETIC AGE

Issued periodically in Erie, Pennsylvania, by the Eriez Manufacturing Company, Producers of Magnetic Equipment.

ERIEZ MAGNETIC PIPELINE TRAP SEPARATES IRON EFFECTIVELY

Efficient, economical protection against the passage of tramp iron through pipelines which convey liquids is afforded by the Eriez Permanent Magnetic Pipeline Trap. The device prevents damage to processing equipment or

Eriez Permanent Magnetic Pipeline Trap

contamination of product by removing stray iron from materials conveyed in the pipes.

The trap is simply constructed. It consists of a cast stainless steel housing and a specially designed permanent magnet element. There are no moving parts.

Stray ferrous material in liquids is caught by the powerful permanent-duty magnet. Cleaning is accomplished by simply removing a face plate; the trap remains in the line.

Available in 2", 2½", 3" and 4" diameters, with threaded ends. The separator withstands pressures up to 75 psi.

For more data on pipeline traps circle No. 4 in coupon and mail to Eriez.

INTERNATIONAL HARVESTER PLANT ENGINEER PRAISES ERIEZ MAGNETIC SEPARATOR

At the Indianapolis Works of the International Harvester Company, an Eriez Permanent Magnetic Pulley is used to separate usable shot from fines in a Pangborn shot blasting machine. The plant engineer reports excellent results.

The unit is separating minute particles of ferrous from non-ferrous material by the use of strong, specially designed Alnico permanent magnets.

The Eriez pulley is 12" in diameter and is inserted in a 12" belt width line. Magnetized

bars run lengthwise of the pulley and create a magnetic field through the belt. The non-magnetic material falls off the belt as it passes the tangent point of the pulley, while the magnetic shot clings to the belt until it is carried out of the magnetic field.

Newly designed 1950 Eriez Magnetic Pulleys are up to 50% stronger. To learn more about these effective separators, circle No. 5 in the coupon and mail to Eriez.

MAGNET CATCHES TRAMP IRON UNDER HIGH HEAT CONDITIONS

An Eriez Plate Magnet installed on a conveyor line at Trico Products, Buffalo, N. Y., is successfully separating tramp iron from scrap zinc despite its exposure to the radiant heat of an adjacent metal-melting furnace.

The fact that the Eriez product utilizes permanent, non-electric Alnico magnets is an important reason for the constant protection afforded Trico under these conditions. No depreciation of magnetism has been observed.

An Eriez Giant magnet is the type used. This is the most powerful model produced commercially. It is used effectively to remove tramp iron and steel from heavy flows of sand, coal, metal, rock products, etc., and for purifying liquids or slurries passing over the separator.

More information about Eriez plate magnets for industry can be obtained by circling No. 6 in the coupon and mailing.

NEW ERIEZ ROTARY MAGNETS SWEEP FLOORS, RETRIEVE PARTS

A low-cost permanent magnetic device for sweeping up or retrieving ferrous material from floors, parking lots, plating tanks, etc., is now being marketed by the Eriez Mfg. Co. These lightweight rotary magnets offer maximum pick-up capacity because the magnetic tube rotates through a full 360° and thereby presents the greatest possible surface area for collection.

Two types are manufactured, floor and tank magnets. The floor magnet has proved invaluable in cleaning up factory floors, driveways, parking lots and other areas. It operates just like a carpet sweeper, with the magnetic tube mounted between Neoprene wheels. Ferrous material literally jumps to the magnet and spreads itself over the entire circumference to a thickness of about ¾". Unloading is accomplished at either end by simply pushing the wiper ring from one end of the tube to the other, where a non-magnetic section causes the load to be released. Several sizes are available.

The tank magnet is extremely useful in removing metal parts or contamination from alkali baths, plating tanks, etc. Design is similar to that of the floor magnet except stainless steel is used in its fabrication to make it acid-proof and alkali-proof. Two different sizes are manufactured.

Prices on the Eriez Rotary Magnets range from $26.50 to $53.50 depending upon model and size. For more information circle No. 3 in coupon and mail to Eriez.

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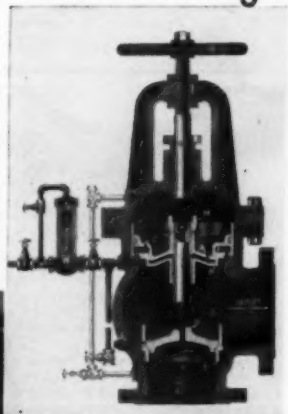
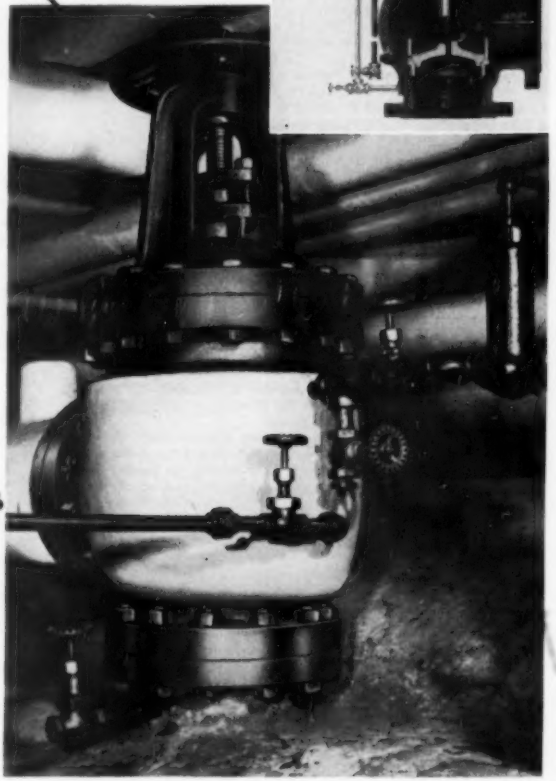
ONE of 7 Golden-Anderson non-return Valves

installed in Boiler Room of Merchandise Mart

CHICAGO, ILLINOIS

G-A Triple Acting Non-Return Valve, Angle Pattern.





Golden-Anderson "Engineered Protection" Valves have protected life and priceless property in Chicago's giant Merchandise Mart since 1930.

These automatic Triple Acting Non-Return Valves cut in a boiler when pressure equals line-header pressure . . . isolate a boiler when pressure is lower than line-header pressure . . . and prevent steam flow from boiler in the event of a sudden drop of line-header pressure. While your job is still in the planning stage—let G-A engineers work with you.

GOLDEN ANDERSON VALVES

GOLDEN-ANDERSON Valve SPECIALTY CO.

Keenan Building, Pittsburgh 22, Pa.

LIFE AND PROPERTY PROTECTION VALVES SINCE 1903

It's an "open and shut" case for flexible connectors

This tire re-capping machine opens and closes all day long. American Seamless Flexible Metal Tubing carries the hot steam in and out under pressure—safely, dependably, despite repeated flexing.

It's another example of how American Seamless Flexible Metal Tubing meets every requirement of the ideal flexible connector:

Seamless; leakproof
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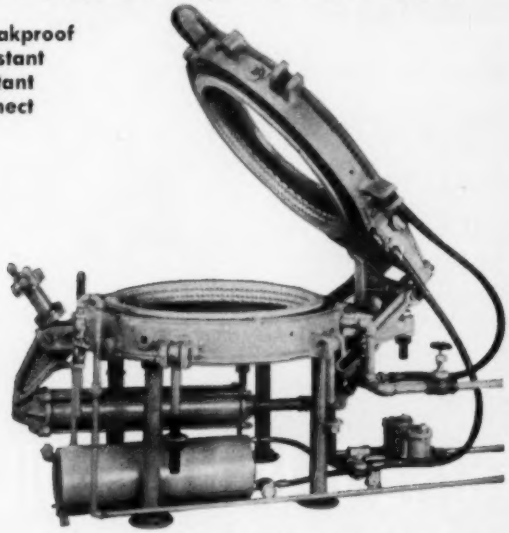
Fatigue-resistant
Easy to connect



American Bronze Seamless Tubing carries steam to and from this automobile tire re-capping machine made by James C. Heintz & Company, Inc., Cleveland, O.

American Seamless Flexible Metal Tubing and American Flexible Metal Hose are made in a wide variety of styles and metals for conveying liquids, many chemicals, gases and semi-solids, under severe conditions of temperature, pressure and mechanical stress ... for protecting wiring and flexible driveshafts ... for connecting misaligned piping or ports.

If your equipment requires movable connectors, let us send you the complete story on American Flexible Metal Hose and Tubing, or let our Technical Department make recommendations. Write to The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada, The Canadian Fairbanks-Morse Co., Ltd.

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FLEXIBLE METAL HOSE AND TUBING

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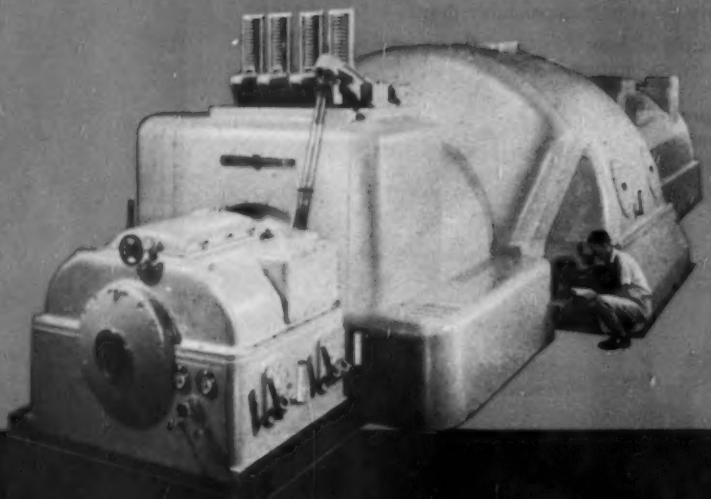

GULF TURBINE FLUSHING OIL

Now—Gulf Turbine Flushing Oil has been further fortified to provide an even more effective rust preventive film! Now you can be sure that all oil bathed surfaces in your new turbine lubricating system are completely protected!

Gulf Turbine Flushing Oil has highly preferential wetting characteristics—displaces water quickly on the internal surfaces of the lubricating system. It should be used as soon as practical after installation of the system.

Gulf Turbine Flushing Oil has excellent flushing action — cleans inaccessible parts of the system, readily picks up dirt particles and carries them to the filter.

An important advantage of Gulf Turbine Flushing Oil over other types (such as certain solvents) is that the undrained portion in the turbine system does not seriously impair the lubricating value of the turbine oil. For Gulf Turbine Flushing Oil is itself a satisfactory lubricant.

Only one-third to one-half of a normal turbine oil fill is required for thorough flushing. Thus the expense of flushing your new turbine with low-cost Gulf Turbine Flushing Oil is nominal.

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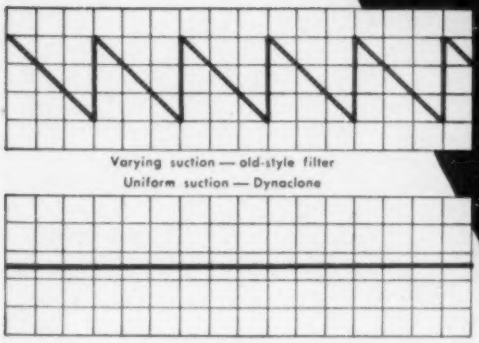

Varying suction — old-style filter
Uniform suction — Dynaclone

1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

*Patent Applied for

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear on the filter bags.

The simplicity of design and operation and elimination of all auxiliary equipment for periodic cleaning of bags mean a saving of floor space and a very minimum of maintenance.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

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Making 1 maintenance dollar do the work of 7

A large Eastern gas manufacturer formerly relied on ordinary high-temperature paints to protect 15,000 square feet of surface on generators, carburetors, superheaters, cross-over and take-off line and boiler stack. At the most, a coating lasted 30 days before peeling. The *monthly maintenance cost*, for material alone, was *$105*.

Then Koppers Bitumastic ® Hi-Heat Gray was given the job. In spite of intermittent temperatures 300° higher than recommended limits for Hi-Heat Gray, the original application of Bitumastic is in excellent condition after more than a year. Material cost was $228—a *monthly cost* of *$15* based on service to date.

These 7-to-1 savings are just on materials. Add on the cost of labor —2½ to 4 times the material cost—and you'll find the total savings are tremendous.

CORROSION PREVENTION IS OUR BUSINESS

Koppers handles the entire job of protecting industrial plants against corrosion. Here are the steps we take to keep industry's No. 1 enemy under control:

SURVEY—Corrosion experts will survey your plant and determine where protection is needed . . . how much protection is needed.

MATERIALS—Koppers offers a complete family of Bitumastic Protective Coatings . . . materials for every job of corrosion prevention.

APPLICATION—Trained applicators are available to make certain that Bitumastic Protective Coatings are put on correctly to give maximum service.

Write today **for complete information on Koppers corrosion prevention service. Remember: 50 to 90 per cent of maintenance and replacement costs are chargeable directly to corrosion!**

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Bulletins on Current Plant Problems

MECHANICAL POWER TRANSMISSION

101 Steel Shaft Data—Bulletin G-7, 28 pp, originally compiled for use by company's own engineers, contains formulas, curves and tables that will materially assist in determining proportions, stresses, combined torsional and bending loads in round, square, hollow, keyway and stepped shafts. Also includes photos showing production of company's worm gearing. IMO-DeLaval Products Div., DeLaval Steam Turbine Co.

102 Flexible Couplings—Bulletin A-414 provides engineering data, specifications, sizes and prices on company's packaged flexible couplings, as well as installation and maintenance tips. Photos illustrate parts and assembly. Dodge Mfg. Corp.

103 Design Data on Oilless Bearings—Here's a 44-pp manual treating on a scientific basis the application of "oilless" wood bearings in modern machine design. Presenting information on loads on bearings, laws of friction, characteristics of wood bearings, lubrication, circular motion, and bearing temperatures. Also contains brief history of bearings. Book is illustrated, indexed for easy reference, and loose-leaf bound with stiff covers. Paramount Oilless Bearing Co., Inc.

104 V-Belt Drive Data—Engineering Data Book 1049 provides 24 pp of information on one- and two-groove fractional horsepower V-belt drives for industrial equipment. Lists advantages of drives. Gives technical data on both stock drives and those made to order. Includes tips on selection of drives and pointers on use of company's sheaves. Rockwood Mfg. Co., Inc.

105 Flexible Couplings—Catalog 57 is a 20 pp data book covering company's standard gear couplings and several special types. Gives general specifications, dimensions, ratings. Also presents an improved gear type designed to permit use of larger shafts and equipment and includes service factors, discussion of seal construction. John Waldron Corp.

106 Worm Gear Speed Reducers—Illustrated Bulletin 125 presents two vertical speed reducers, one with gear shaft downward and the other with gear shaft upward, suited to such equipment as agitators and mixers. Provides complete dimensional data, cross-section drawings, thrust and overhung load capacity charts on these and other vertical units. The Cleveland Worm & Gear Co.

107 Stock Sprockets—Bulletin 49-39 describes and lists company's stock size cast sprockets for drive and conveyor chains. Dimensions, specifications, list prices, sprocket style and other necessary data are included. Sprockets for practically all sizes and styles of chain (except that using cut tooth sprockets) are listed. Also given are rules for selection, alignment and care of sprockets, together with complete information for ordering. Chain Belt Co.

108 Flexible Couplings—Catalog 48 covers flexible couplings, standard and heavy-duty gear type flexible couplings, universal couplings and a combination automatic backstop and flexible couplings. Includes descriptions, installation data, ratings, dimensions, weights and prices. Illustrated with photos, dimensional sketches. D. O. James Gear Mfg. Co.

109 Speed Reducer Selector—Bulletin A-470 tells the story of manufacturer's new "Torque-Arm" speed reducers. It is augmented by full-size photos of entire mechanism and simplified selection tables. The only information required to select proper size reducer for a given application is the horsepower required and speed and size of shaft to be driven. It is also possible, from tables provided, to determine size of V-belts and sheaves required for the drives. Dodge Mfg. Corp.

BOILERS, GENERATORS AND STEAM SYSTEM ACCESSORIES

110 Air Venting for Steam Equipment—Bulletin 275-A explains and illustrates air venting of industrial steam equipment. Discusses the effect of air in steam spaces, installation of air vents, and venting under special conditions. Also describes and pictures company's thermostatic air vents, giving their sizes, prices. Sarco Co., Inc.

111 Tube Cleaners—Bulletin Y-29 describes and illustrates tube cleaners for all purposes. This handy guide covers applications of tube cleaners for removing scale and other types of encrustation from tubes or pipes in boiler room equipment, oil refineries, process plants and other locations. Various types of motors, cutter heads, drills, brushes, operating hose and couplings are fully described and the bulletin offers many helpful hints on the care and operation of tube cleaners. Lagonda Div., Elliott Co.

112 Vertical Tubular Boilers—Bulletin ID-50-44 is a specification sheet covering manufacturer's new vertical tubular boiler-burner units for high pressure steam, sized for 3 to 15 hp. Illustrates unit, includes sizes and dimensions, also tips on installation, operation, maintenance and cleaning. York-Shipley Inc.

113 Oil-Fired Generators—Illustrated Bulletin ID-49-30 describes a fully-automatic packaged generator of 15 to 150 hp capacity, for low or high pressure steam or hot water designed for burning low cost No. 5 fuel oil. Includes capacity and dimensional data on this model as well as general specifications and advantages of company's automatic generators. York-Shipley Inc.

114 Hot Water Heaters—Catalog 302, 28 pp, provides typical piping arrangements, instructions for selection, dimensions etc. on manufacturer's two-, four- and six-pass instantaneous hot water heaters. Also contains data on condensate coolers, hot water service heaters, and gravity flow and booster heaters. Book classifies heaters according to pounds of steam and is thumb-indexed for easy use. Patterson-Kelley Co. Inc.

115 De-Scaler for Hot Water, Steam Systems—An electrolytic de-scaling unit and its efficiency and economy in eliminating scale formation, rust and corrosion in hot water and steam systems are presented in this bulletin. Illustrates several models and their methods of installation in tanks, boilers and piping. Includes de-scaler life chart at varying pressures. Butler Engineering Co.

116 Reducing Valve Selection—Specifying reducing valves to suit the intended service is simplified by the handy selection chart furnished with Bulletin 148 and compiled for use with it. The bulletin provides engineering data, sizes, descriptions and illustrations of lever and weight valves, air loaded, pilot controlled and spring loaded types for steam, air and water lines. The chart, by reference to service, reduced pressure limits and other factors, aids in determining type of valve and correct size. Also indicates which valves are suitable for dead end service and which are not. Prices listed. Klipfel Mfg. Co.

MATERIALS HANDLING

117 Power Trucks and Stacker—Illustrated with photos of this equipment at work and dimensional sketches of different models, Bulletin 24 gives specifications, application information and operating advantages of manufacturer's electric lift trucks for horizontal movement, and combined stacking units. Special design features are described and illustrated by photo. Lewis-Shepard Products, Inc.

118 Roller Conveyor—Form 87-848 describes tubular style lightweight gravity roller conveyors for quick movement of cartons, boxes, cases. Explains and illustrates main features of conveyor, gives sizes, general specifications. Speedways Conveyors, Inc.

119 Wheeled Lift Jack—This bulletin tells how one man and a pair of company's jacks can handle loads up to 2000 lb. Shows how a twist of the toggle arrangement lifts the heavy, bulky load off the floor and puts it on roller bearing wheels. Stresses efficiency in moving crates, file cabinets, display fixtures. The Winkiemann Co.

120 General Purpose Hoists—Catalog 100-H-40 presents single-line pull, 3 to 40 hp hoists of 2500 to 4000 lb capacities. Covers double and single-drum gasoline or electric powered models as well as hoists for

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use with plant's own power, for air-cooled or water-cooled operation. Discusses and illustrates construction features, safety provisions. Also describes and pictures a derrick swinger. Includes specifications. American Hoist and Derrick Co.

121 Steel Wire Pallets—Bulletin RFI illustrates company's steel wire pallets and pallet containers and tells how they offer an efficient method of materials handling and storage. Gives sizes, standard specifications. Union Steel Products Co.

122 Efficiency in Small Tool Manufacturing—Job Study 92 outlines handling methods which resulted in savings in the manufacture of small precision tools and grinders, telling how on one job involving 600 t of electric sheet steel the company saved $2,440.40 in a year, while increasing storage space and reducing handling time and labor. Illustrated with photos and sketches. Towmotor Corp.

123 Drum Handling Truck—Bulletin 44-949 describes and illustrates a vertical drum truck with which one man can position heavy drum loads of paints, chemicals and other liquids and semi-liquids. Includes specifications, prices. Morse Mfg. Co., Inc.

124 Loading Dock Ramps—Pictured in Form 626 are several industrial installations of company's tilting dock ramps. Also describes operating principle of these ramps and includes specifications and dimensional sketch of typical air-oil installation. The Wayne Pump Co.

PACKINGS

125 Sheet Packings—In addition to presenting specifications and application data on several types of rubber sheet and slab packings, this booklet includes catalog listings of other rubber products. Covers mallets, bulbs, pump diaphragms, stuffing box rings and similar molded items, extruded products, lathe cut and hand made gaskets, and rubber covered rolls. Republic Rubber Div., Lee Rubber & Tire Corp.

126 Gaskets and Packings—This booklet presents products utilizing Teflon, described as a chemically inert material with low power factor and low dielectric constant. Describes and illustrates Teflon jacketed gaskets and valve packings, solid Teflon gaskets, Teflon-filled spiral wound gaskets and Teflon valve packings. Includes sketches showing 16 types of gasket construction. United States Gasket Co.

127 Metallic Packing—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed and how it works, and how it is used in compressors, engines, pumps. Sketches show rotating shaft and reciprocating rod installations. A. W. Chesterton Co.

128 Tower Packing—Form P45-1 presents the uses and features of a glass fiber packing material for distillation, contact and eliminator purposes, absorption towers, scrubbers and solvent recovery work. Includes photos and drawings of installations. Owens-Corning Fiberglas Corp.

129 Hydraulic Packings Data Book—Catalog 5-A covers the physical characteristics, applications, and installation of O-ring hydraulic packings. Includes sizes, dimensional data for installation. Sketches illustrate a typical installation of cord rings, gland design for combination O-ring packing with standard non-extrusion rings. Minnesota Rubber and Gasket Co.

130 Self-Lubricating Packings—Bulletin LP-10 discusses in detail self-lubricating packings for wide industrial use. Text covers the principles of self-lubricating design, structure and performance as well as analysis of each individual packing from standpoint of application to specific services. Packing illustrations and specifications included. Greene, Tweed & Co.

PUMPS, COMPRESSORS

131 Sewage and Trash Pumps—Bulletin 5400E-1, features details of construction and drive modifications possible with company's vertical shaft and horizontal shaft bladeless pumps, and is generously illustrated with photos of pumps and sectional drawings. Includes general discussion of pumps, typical specifications, dimensional data, selection tables, performance characteristics chart. Fairbanks, Morse & Co.

132 Direct-Connected Pumps—Bulletin 111 presents a direct-connected pump in capacities of 5, 10 and 20 gpm for operating pressures up to 100 lb. Explains pump's principle of operation, mechanical features and includes photos of pumps and motor-driven, engine-driven and belt-driven pump units. Also provides full specifications. Blackmer Pump Co.

133 Auxiliary Air Compresser Units—Form 780R explains an auxiliary unit plan for decentralizing industrial air supply system and cites typical example of several smaller units being used efficiently in a manufacturing plant. Lists 10 main advantages of the plan. The Wayne Pump Co.

134 Centrifugal Pumps—This bulletin stresses construction and maintenance features of company's unit-built centrifugal pumps. Gives dimensional and capacity data and lists several makes of motors for use with these pumps. Includes pointers on installing of pumps, piping, priming, operation and lubrication. Bell & Gossett Co.

135 Centrifugal and Piston Pumps—Catalog L is a 24-pp collection of engineering data on several types of volute pumps, duplex piston pumps, automatic feed pump and receiver, plunger pumps. Provides operating information, applications, dimensions, construction details and characteristics. Illustrations include photos of pumps, sectional sketches. Scranton Pump Div., Condenser Service & Engineering Co., Inc.

136 Centrifugal Pumps — Featuring a large cutaway illustration in color which shows design details and important operating features, Bulletin 382 presents centrifugal pumps for boiler feed and high pressure service adaptable to electric motor, steam turbine or engine drive. Discusses pumps' construction and possible modifications, includes approximate dimensions, photos of several models. American-Marsh Pumps, Inc.

HEAT EXCHANGERS AND ACCESSORIES

137 Heat Exchange Coils—Catalog Section 41 describes and illustrates, by photos, company's heat exchange coils and their use in cooling systems. Stresses their stepped up temperature performance. Includes specifications, dimensional data. Binks Mfg. Co.

138 Lube Oil and Jacket Water Coolers—Illustrated with many photos of complete assemblies, component parts and typical installations, this 24-pp catalog covers a heat exchanger design widely used for liquid to liquid heat transfer where working pressures and temperature ranges are moderate and fouling characteristics of fluids necessitate removable tube bundle units. Details construction of the coolers and provides full engineering data on two-pass and single-pass channel and bonnet types. Includes diagram of several floating head and removable bundle designs. Also discusses and pictures company's maintenance service. Condenser Service and Engineering Co., Inc.

ELECTRICAL

139 Circuit Breakers—Illustrated Equipment Bulletin 3100 covers production and advantages of non-thermal, fully magnetic panelboard circuit breaker. Complete with graphs, schematic diagrams, engineering drawings, cutaway views and ratings, it also includes data on application, operation and construction of the circuit breaker. Heinemann Electric Co.

140 Wiring Guide—Catalog and Wiring Guide 18 is a 112-pp handbook covering company's line of surface metal raceways and fittings and listing several new fittings and developments. These include a wire pulley for guiding wires into 500 and 700 raceways, a wall box connector providing for connection to flush mounted wall box which may be fed by pipe or armored cable, a circuit breaker cover designed to accept a quick-lag type of circuit breaker, and a reducing connector. Catalog is illustrated and gives complete installation details covering all of company's wiring systems. The Wiremold Co.

141 Ordering Book for Switches, Controls—This is company's 68-pp merchandising catalog covering complete line of safety switches, service controls and multibreakers, motor controls, related equipment and accessories. Fully illustrated it provides recommendations for use, ratings, dimensions and all necessary ordering data including prices. Also references to company's other literature on various items listed. Cutler-Hammer, Inc.

142 Strip Selenium Rectifiers—Voltage regulation curves and other engineering data are provided in this folder introducing company's thin rectifiers. Includes actual size photos of half-wave strips and half-wave stack. Standard Arcturus Corp.

(Continued on page 85)

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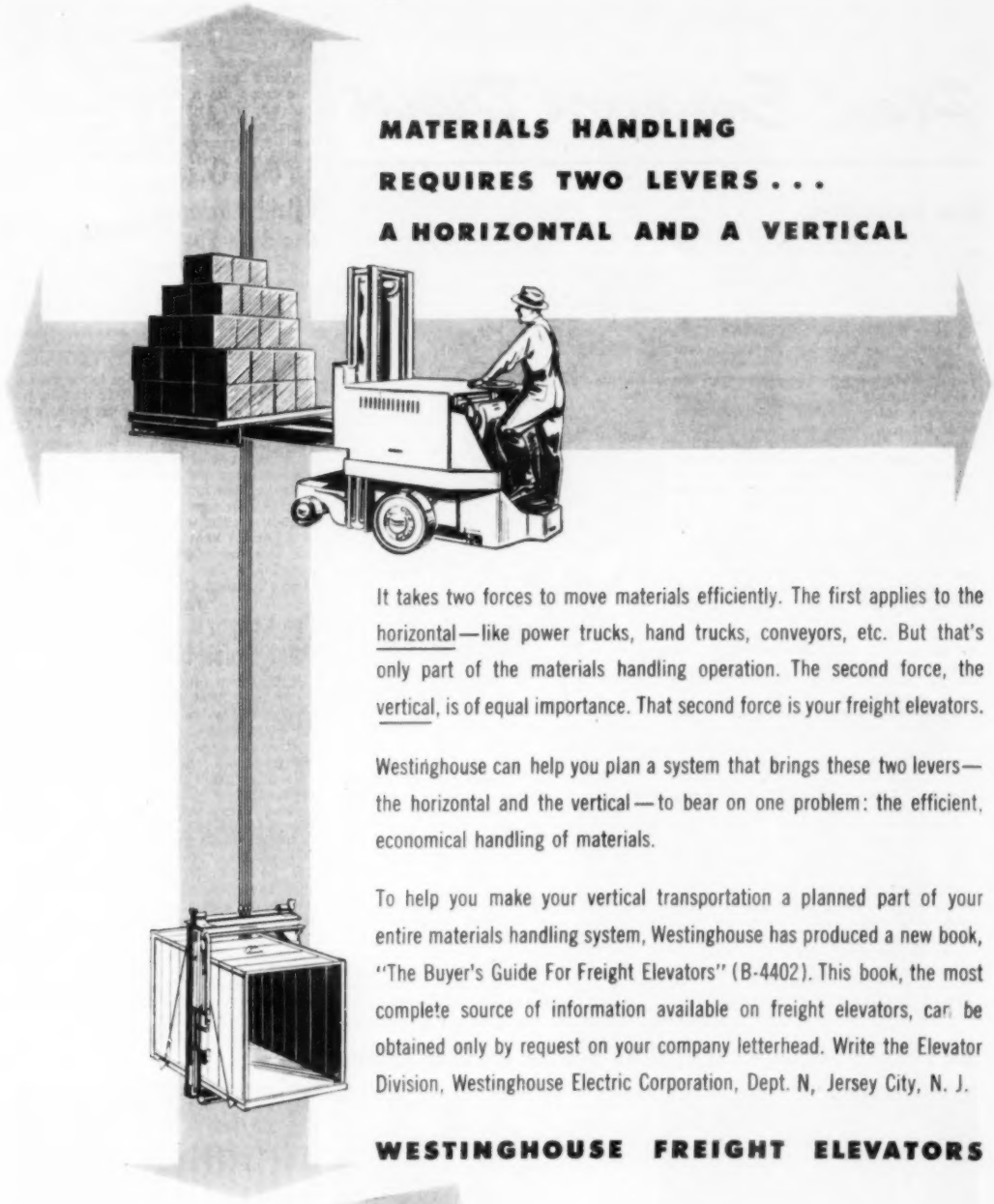

MATERIALS HANDLING
REQUIRES TWO LEVERS . . .
A HORIZONTAL AND A VERTICAL

It takes two forces to move materials efficiently. The first applies to the horizontal—like power trucks, hand trucks, conveyors, etc. But that's only part of the materials handling operation. The second force, the vertical, is of equal importance. That second force is your freight elevators.

Westinghouse can help you plan a system that brings these two levers—the horizontal and the vertical—to bear on one problem: the efficient, economical handling of materials.

To help you make your vertical transportation a planned part of your entire materials handling system, Westinghouse has produced a new book, "The Buyer's Guide For Freight Elevators" (B-4402). This book, the most complete source of information available on freight elevators, can be obtained only by request on your company letterhead. Write the Elevator Division, Westinghouse Electric Corporation, Dept. N, Jersey City, N. J.

WESTINGHOUSE FREIGHT ELEVATORS

YOU CAN BE SURE...IF IT'S
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Plant Engineers' Digest

New Burlap Bags

A SUGAR refining company recently had a bag problem at one of its plants. Upon arrival of the cargo ships, the sugar is unloaded and dumped from the bags. Since the bags have a high reclaim value, it is profitable to salvage them.

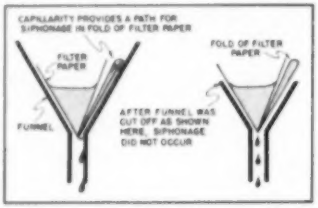
Some of the bags become sticky and gooey from the cargo they carry and require washing before they can be sold. Ordinary laundry methods, however, are not adaptable. The bags must soak for a time to wash out adhering sugar and dirt, then dried thoroughly.

The sugar refining engineers set out to build a dryer which would do an efficient job in the shortest possible time. First, they constructed a long tunnel. Within the tunnel they set up a slatted conveyor. Each slat was provided with a set of hooks like those you see in a butcher shop. That was comparatively easy but the business of providing fast heat wasn't quite as simple. A lot of Btu's had to be provided and at the same time a lot of warm air had to be moved fast. The company ordered unit heaters, some of which were partly inverted with regular heating coils mounted at the side, with fan outlet at the bottom and motor on the end. The others were completely inverted with the coil at the top and the outlet at the bottom. A second coil with the steam distributing tube nonfreeze feature was added ahead of the regular coil in the air stream.

Duct-work brought in outside air from the roof. The steam distributing tube coil began the heating process and even though entering air temperatures were below 32 deg. freezing could not occur. The regular heating coil in the unit completed the process as the fans forced the heated air into the dryer. Each of the other units was mounted adjacent to a plenum chamber projecting at regular intervals atop the dryer. As the dryer operates, each blower unit heater picks up its share of air—reheats and delivers it down over the bags. At the end of the line the air is discharged again to the outside. *From Trane Weather Magic, Jan. 1950, a publication of The Trane Co., La Crosse, Wis.*

Solving a Filter Paper Problem

WHEN ATTEMPTING to use our boiler water test kit, we were puzzled to find that, although we used the filter paper and funnel supplied by the manufacturer (a leader in the field), the suspended matter was rarely removed from the samples.


CAPILLARITY PROVIDES A PATH FOR SIPHONAGE IN FOLD OF FILTER PAPER
FILTER PAPER
FUNNEL
AFTER FUNNEL WAS CUT OFF AS SHOWN HERE, SIPHONAGE DID NOT OCCUR
FOLD OF FILTER PAPER

Funnel was cut off (right) and filtrate then passed through crystal clear

Thinking that possibly as we poured the water into the funnel a little was spilled outside the paper, we tried using a medicine dropper, being sure that not a particle of water went astray, but the results were the same.

Careful examination of the filter paper never disclosed a hole, but in case there might be any defect in the paper a new lot was obtained from the manufacturer; however, the results were no better.

At last we theorized, strange though it seemed, that capillarity within the fold of the paper provided a duct by which water was siphoned to the bottom of the funnel. Accordingly, the plastic funnel was cut off as shown in sketch. Thereafter the filtrate invariable came down crystal clear, showing that our assumption had been correct. *From an article by A. Thompson, in Jan. 1950 issue of Power Generation, a publication of Technical Publishing Co., Chicago 4, Ill.*

Calcium Chloride Can Save Fuel

THE NATIONAL Fire Protection Association has issued a bulletin warning industry to maintain sufficient heat in buildings to keep automatic sprinkler systems, extinguishers, standpipe and hose equipment using water, from freezing.

In many cases, industries have used a calcium chloride solution in automatic sprinkler systems to prevent pipes and spray heads from freezing. The use of an antifreeze solution in the system is especially useful in storages where low temperatures are necessary. Many industries have found that much fuel can be saved in some buildings during the winter months where there is no need to maintain heat other than to prevent the freezing of fire appliances. *From Dowflakes, Jan. 1950, a publication of Dow Chemical Co.*

For Longer Paint Brush Life

HERE ARE a few pointers to help you secure the best possible service from your brushes and get a good long run for your brush money.

Breaking in Brush—A preliminary 48- to 72-hour soaking in raw linseed oil will saturate the porous bristles and prevent paint pigments or gums from getting cemented within the bristles. For this oil bath, the bristles should be laid perfectly straight and then wrapped in wrapping paper. Just before use, unwrap the brush, wipe out the surplus oil against the side of the pail and then spin the brush over some large receptacle that will catch the oil droplets thrown off by the spinning. After the spinning, comb the bristles straight.

Brush Care—To make a brush last longer, do not use it edgewise in pinch-

Let's Play it Safe in Working, Fire Protection and Plant Operations

The kick of a mule is mild compared to the fly-back of a lift truck handle if the trucker has not properly engaged the dog as shown here. Always play safe by pushing the handle way down

The minimum clearance for material stored in a building equipped with a sprinkler system is 12 in. below any sprinkler heads. If a fire broke out here, sprinkler would be ineffective

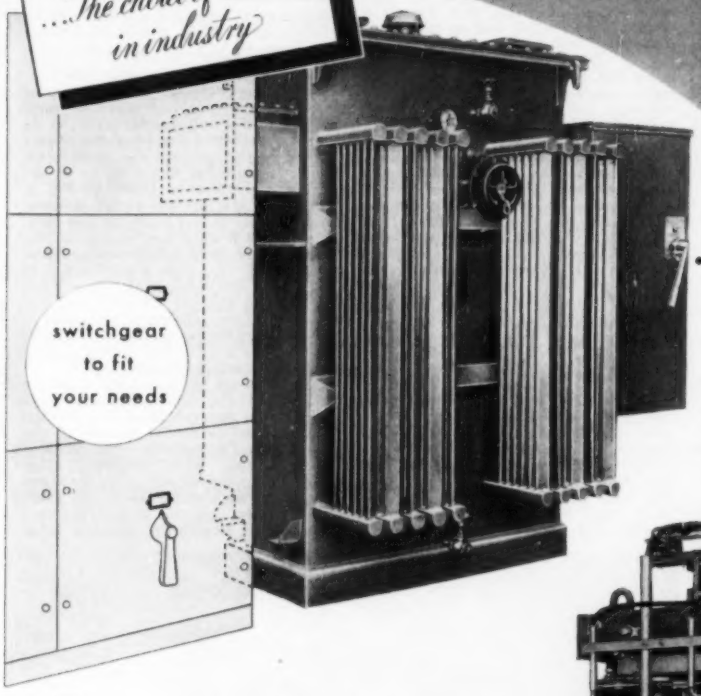
Photo: GF News, General Fireproofing Co.

Unlike the ostrich, this fellow is sticking his head out looking for trouble. Elevators have a peculiar habit of coming up or down just as a person is sticking his head in the shaft to look

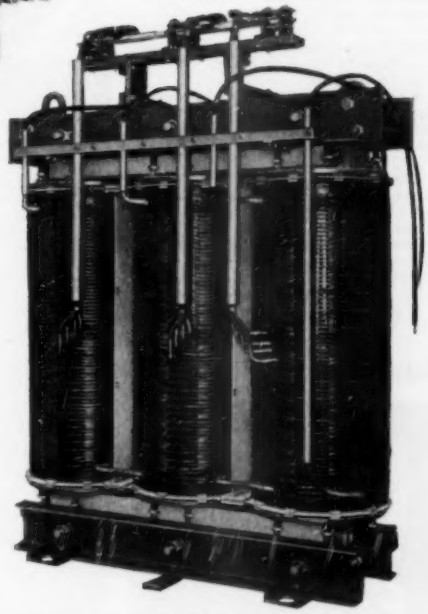
WAGNER TRANSFORMERS
...The choice of leaders in industry

Wagner Unit Substation Transformers .....

designed to meet your distribution requirements



Core and coil assemblies of Wagner unit substation transformers are designed by experienced engineers, and built and tested by skilled workers. Highest quality materials are used throughout, and meticulous attention to detail marks each step in their construction.



The transformer is the vital part of a load center distribution system. If the transformer fails, the entire system is dead whereas only part of the distribution system is affected by the failure of a switch or circuit breaker.

You can be sure of a dependable continuous flow of power from a Wagner transformer and you can be sure that it has been carefully designed to meet your distribution requirements.

Wagner unit substation transformers with incoming high voltage switch sections to meet your requirements, and with proper throats on the secondary side to connect to any make of switchgear, are available in the usual range of ratings up to 2000 kva. Our factory-trained sales engineers are well qualified to recommend the various combinations necessary to handle your unit substation requirements and they will be glad to give you immediate service.

Wagner unit substation transformers have been installed in all kinds of industrial plants including synthetic rubber, petroleum, steel, chemical, aircraft, automotive, paper, and many others. The importance of the transformer in a unit substation justifies calling in the Wagner sales engineer to help solve your load center problems.

Bulletins TU-13 and TU-56 describe the design and construction features that make Wagner liquid-filled and dry-type unit substation transformers outstanding.

WAGNER ELECTRIC CORPORATION
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EST. 1891

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AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

T50-6A

tight corners and recesses. This will cause "fingering" which, if not smoothed out, will take a permanent set and ruin the brush. If it is necessary to use a wide brush edgewise, as in trimming a corner, remove the "fingering" at once with a couple of broadside strokes against the sides of the paint bucket. Paint should be applied from the end of the bristle and by cultivating a free, easy stroke and reversing the brush at frequent intervals, a good quality brush should lay paint on nicely for many years.

Cleaning Brush—Another important step is the proper cleaning of the brush. Two things should be kept in mind: the right cleaning liquid and proper working of the paint material from the bristles.

For	Use
Oil base finishes and varnish	Turps, followed by mineral spirits
Shellac or alcohol stains	Denatured alcohol
Lacquer	Lacquer thinner
Calcimine, emulsion water-thinned paints	Warm water (within one hour of use)

Steps to be followed in cleaning the brush are: 1. Cleaning fluid should be poured into a deep bucket to a depth of about 2 in.; 2. Press brush into liquid, flat side down to force cleaning fluid into heel; 3. With dull putty knife, carefully scrape off adhering paint; 4. With comb or stiff brush, work out paint; 5. Open bristles to clean out heel with dull knife; 6. Spin brush in cleaning liquid; 7. After brush is thoroughly clean and dry, carefully wrap in paper.

Wrapping Brush—1. Dip wrapping paper in raw linseed oil; 2. Upon removal of paper, place brush flat on paper and wrap in folds; 3. Fold extended end of paper back to ferrule and tie securely; 4. Pour a little linseed oil into the brush between the bristles and inner wrapping; 5. Suspend brush in can of linseed oil. Be sure the tip of the brush does not rest against the bottom of the can. (See PLANT ENGINEERING, Aug., 1948, p. 35.—Ed.) *From Dutch Boy Painter, Vol. 41, No. 3, a publication of National Lead Co., New York 6, N. Y.*

Metals are Like Butter Now

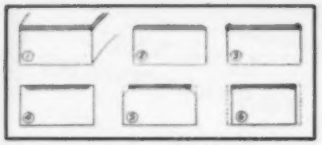
This electronic torch is so hot it can melt firebrick and even tungsten, which melts at 3370 C. No uses have been found as yet for the extremely hot torch, which is still at the laboratory stage of development. (From a news release of General Electric Co., N. Y.

How to Make Sharp Edges When Hard-Facing

HERE ARE two ways to deposit hard-facing rod to get a sharp, square edge. Fig. 1 shows a hard-faced steel part in its finished shape. To deposit hard-facing alloy so it will clean up with square edges like this, first deposit a layer of hard-facing rod on the edge.

The edge will round off, as shown in Fig. 2. Of course, it is impossible to grind this part and have straight sides and a sharp corner. The hard-facing rod must flow over the edges as shown in Fig. 3. This is called "edge-beading."

To get an edge like this point the blowpipe flame directly at the edge. Only the surface of the hard-facing alloy you have just deposited should be melted. Hold the welding rod directly over the edge with the end of the rod in the flame and just about touching the metal. When the metal comes to the melting point start to deposit the rod metal to form a bead slightly wider than the first layer.



Here are two examples of how to make sharp edges when doing hard-facing

Sometimes you may want to do away with edge beading and make it easier to control the weld metal. You can do this by making a groove of the proper width in the part to be hard-faced. Leave a shoulder about $\frac{1}{16}$ to $\frac{1}{8}$ in. wide at each side as shown in Fig. 4. Then you can fill the entire grooved section to its proper height at one time. Figs. 5 and 6 show how to cut off the shoulder and finish off the ends. *From Linde Tips, Jan. 1950, a publication of The Linde Air Products Co., New York.*

Putting Dead Space to Use

SPACE IS a premium item with most companies and here is a sample of what The Maytag Co. is doing to put dead space to use. The storage area was planned to take advantage of vertical space rather than to tie up valuable floor area and is 20 ft deep and 54 ft long. Height from the floor to the mezzanine is 8 ft. Depth from the lowest beam in the ceiling to the mezzanine floor is 7 ft. The railing extends 3 ft above the mezzanine floor.

The cabinets are supported from the floor level and the mezzanine runs around the upper half of the cabinets primarily to carry the weight of the attendants. The walkway is constructed of solid plate with reinforced angle irons. The shelves will support about 700 lb of weight each. *From The Maytag Bulletin, Jan. 26, 1950, a publication of The Maytag Co., Newton, Iowa.*

Vertical space is being utilized by adding a second story to the supply crib, which is easily accessible by use of the walkway shown at left

All the piping equipment you need ...on one order to CRANE

SMALL STEEL VALVES WITH BIG VALVE FEATURES

Crane 600-Pound Small Steel Gates with Union Bonnet—for steam, water, gas, or air—are smaller, lighter, and more compact than usual high pressure design . . . yet are amply strong. Metal sections at all points provide extra strength and safety under rough usage and extreme pressure-temperature conditions.

Body, bonnet and yoke are high quality carbon steel. Seating is Hardened Stainless to Exelloy, offering superior resistance to wear, corrosion, and temperature effects. Husky bonnet ring with long, precision-cut threads pulls up easily . . . always stays tight. Long-lived blowout-proof gasket in bonnet joint is unaffected by highest temperatures or fluids on recommended services. For more information, **write for circular AD-1741.**

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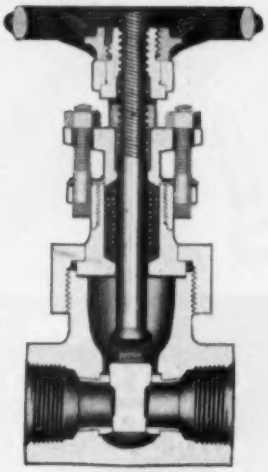
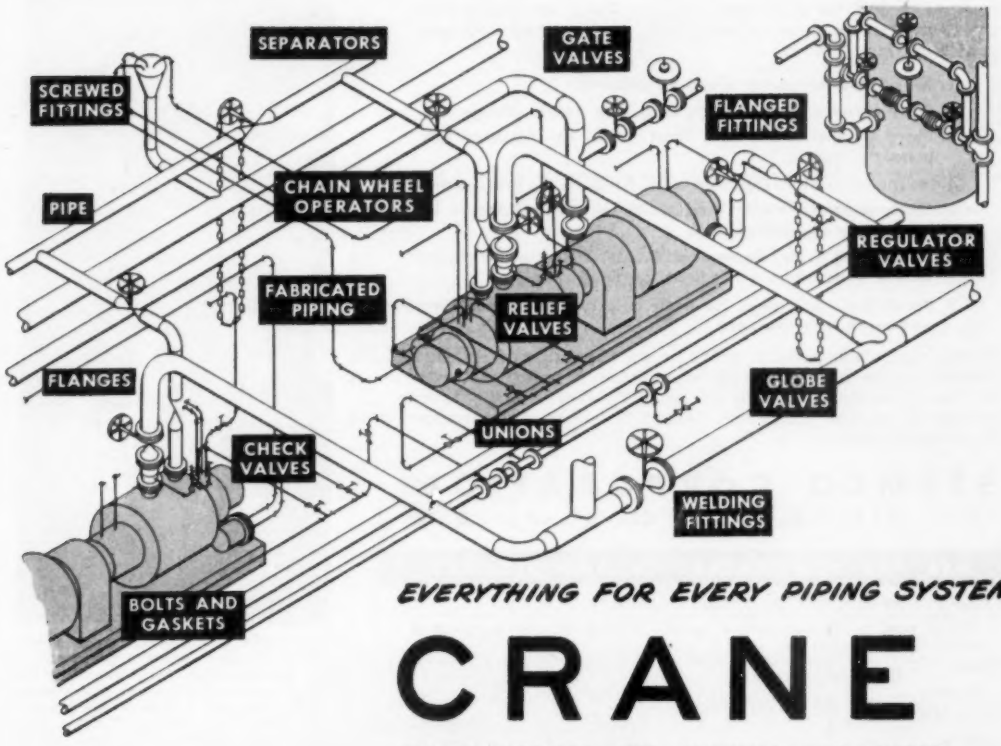


No. 3602XW

For steam up to 850 deg. F., and for water, gas, or air.
Sizes: ¼ to 2 in.
Screwed or welding ends

THIS POWER PLANT INSTALLATION, FOR EXAMPLE, CAN BE COMPLETELY EQUIPPED BY CRANE



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RAM COSTS DOWN with Ramset Fastening System

Quicker than lightning, the self-contained RAMSET TOOL instantly sets drive pins or threaded studs through steel or wood, into steel, concrete, masonry, other hard materials. Slashes costs and time up to 80% for such fastening jobs. Takes less than a minute from start to finish—faster than you can load and light your pipe! Here's why:

1. **No drilling, chipping, plugging, tapping.**
2. **Insert RAMSET FASTENER into tool, with power charge.**
3. **Place against work spot. Then RAM! The fastener sets, instantly, tightly.**
4. **No make-ready or clean-up work. No muss, no fuss, no dirt.**
5. **Light, compact RAMSET TOOL needs no external power. It's completely self-contained.**
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7. **Small first cost, pays for itself quickly—and it's savings and profit from then on!**

Every day, thousands of users prove the value of RAMSET SYSTEM . . . the pioneer in powder-actuated fastening methods. A 15-minute demonstration will prove its cost-reducing, time-saving values. Call your local RAMSET Specialist or use coupon for complete details.

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Please send further information on cost-cutting, time-saving value of RAMSET FASTENING SYSTEM.

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Welders Play Russian Roulette

SOME WELDERS have discovered that the tanks which supply oxygen for their oxy-acetylene flame provide a handy surface against which to light their torches. They do not stop to consider whether or not this is a safe practice.

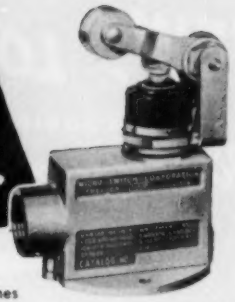
As any qualified welder should know, the temperature of any oxy-acetylene flame is approximately 6000 F, far above the melting point of all commercial metals. It is obvious that heat will soften metal. It is not necessary, therefore, to go into the physics or chemistry of expanding gases and the combination of oxygen and heated steel to predict what will happen when heat is applied to the walls of a tank carrying 2000 psi.

But if there are some welders still curious about the result, they can find out for themselves. It is suggested, however, that they move their tank and equipment into a two-acre field where they alone may take a quick trip to eternity, without endangering the lives of everyone in the vicinity. *From The Briggs Assembler, Feb. 1950, a publication of Briggs Mfg. Co., Detroit 34, Mich.*

New Tip-Up Oiler Saves Time

This tip-up oiler operated with a pull wire in a long handle was contrived by the machine repairman for oiling fly wheel cups on tall presses. This reduces oiling time and is a good safety measure. (From the Pontiac Warrior, Dec. 1949, a publication of Pontiac Motor Div., GMC, Pontiac 11, Michigan)

MICRO PRECISION SWITCHES for Production Short Cuts



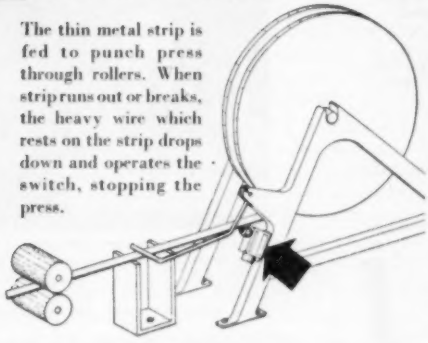
MICRO . . .
first name in precision switches

Industry's drive for lower production costs makes plant engineers, maintenance men and electricians key men in manufacturing plants. MICRO snap-action switches are important tools for increasing efficiency in production.

Illustrated on this page are a few ways in which MICRO products have been incorporated in old equipment to give the up-to-date production features.

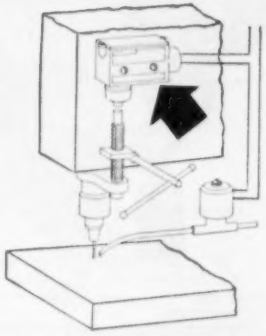
1 MICRO precision switch stops press when material runs out

The thin metal strip is fed to punch press through rollers. When strip runs out or breaks, the heavy wire which rests on the strip drops down and operates the switch, stopping the press.



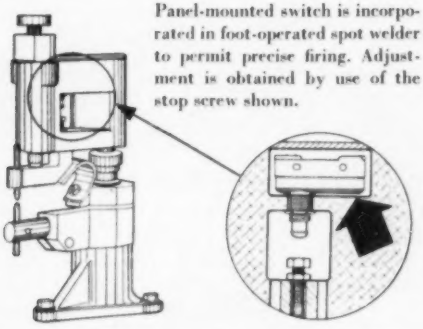
2 MICRO precision switch controls flow of oil to drills and taps

Oil is supplied from pumps to the drills and taps on the machine. Vertical travel of the spindle operates the switch and allows oil to flow on work. Return of spindle causes switch to shut off oil.

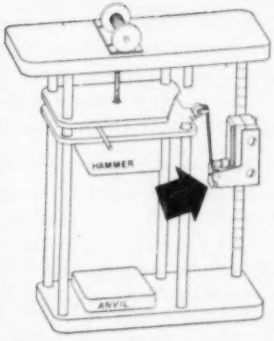


3 MICRO precision switch permits precise firing of weld timer

Panel-mounted switch is incorporated in foot-operated spot welder to permit precise firing. Adjustment is obtained by use of the stop screw shown.



4 MICRO precision switch saves time in testing impact resistance



Switch is connected in circuit of motor which raises impact hammer to desired height. Height is graduated by sliding switch clamp up or down the post.

MICRO SWITCH Distributors with complete stocks are located in ninety cities to supply you with just the right switch to make your plant operations more automatic. Look them up under "Switches, Electric" in your local classified phone book or write:

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A DIVISION OF FIRST INDUSTRIAL CORPORATION
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NEW! LOW-PRICED!

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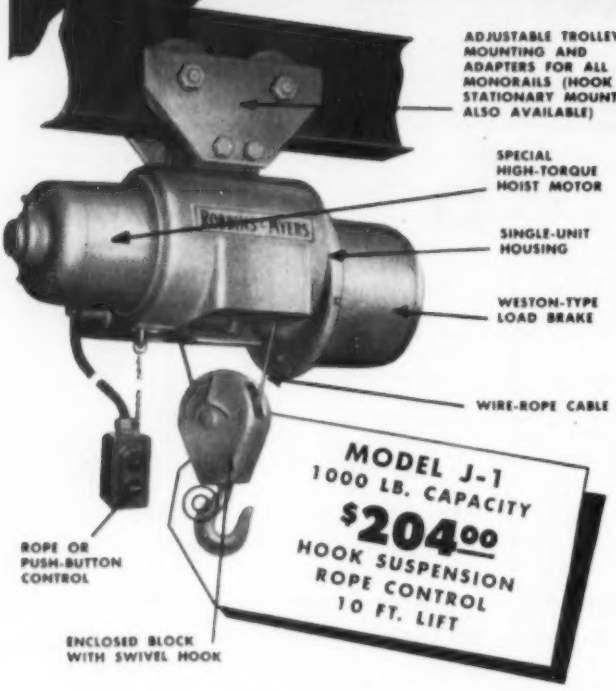
Wire Rope ELECTRIC HOIST



You asked for a low-priced Robbins & Myers electric hoist . . . here it is! Quality-engineered and manufactured by the experienced men who make much heavier R & M hoists, this new "J" hoist will end a lot more costly, back-breaking lifting, give skilled labor more time to use their skills.

Lug, hook or trolley mounting . . . adaptable to 7 different beam sizes . . . the reliable "J" hoist is versatile, easy to operate. Little headroom is required. High-torque motor tailored to your exact needs. Push-button control for accurate spotting. Single-unit housing assures positive alignment. This hoist is ruggedly built; requires little maintenance. Sizes ¼, ½ and 1 ton.

(WRITE FOR BULLETIN 451-PE)

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SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

Bladeless Trash Pump Does Man-Size Job

CLEAR WATER pumping presents no problems other than efficient design for a given condition. The handling of liquids containing foreign substances is another matter. Entrained trash such as solids, rags and other fibrous matter has been a source of trouble for the pump user for many years. These materials render reciprocating pumps inoperable within a few hours; conventional clear water pumps fare only a little better.

A bladeless pump is being introduced for industrial use for pumping liquids containing matter which would clog an impeller pump, such as sewage containing trash.

The impeller is bladeless. There are no vanes or blades on which trash and other fibrous material can catch. Instead, fluid passes past impeller through a single rotating channel or passage way with centrifugal force doing the work.

The bladeless pump swallows canvas rags of this size. Conventional pumps which were used in a competitive test gagged on 2 by 12 in. strips and expired when they were fed 12 in. squares

In tests, this bladeless type pump has handled trash up to 25 times larger than that handled by pumps of conventional impeller design intended for trash disposal and similar service. As pump is virtually clog-free, pump will require less attention in actual operation as well as less maintenance. *From Fairbanks-Morse News, Vol XXV, No. 6, a publication of Fairbanks, Morse & Co., Chicago 5, Ill.*

Hints for Cutting Thick Steel

WHEN YOU first try to cut thick steel the important thing to remember is to use the oxygen pressure recommended by the manufacturer of your blowpipe. Many operators make the mistake of increasing the oxygen pressure because the material is thicker than they usually cut. But this will give you a lot of trouble. High pressures cause distortion of the cut. Frequently, an increase in pressure will form a cavity which prevents the cut from progressing to the desired depth.

Cutting Straight Lines—Figure 1A shows what may happen on some of your straight-line cutting jobs. A pocket has been formed and further downward penetration will stop. Here

IS YOUR SLIPPAGE SHOWING?

..Important question for users of reciprocating pumps and air or hydraulic cylinder mechanisms

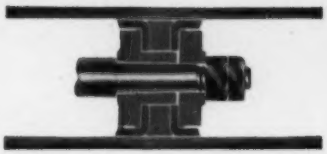
ILLUSTRATIONS at right show how Darcova Pumcups, in contrast to ordinary piston packing, virtually eliminate fluid slippage for the entire life of the packing. And, Pumcup life is many times that of ordinary packing.

By holding slippage to an absolute minimum, Pumcups permit reduced operating speeds, maintain high volumetric efficiency, prolong equipment life, save power, prevent wire-draw and uneven cylinder wear, and eliminate the need for frequent replacement shutdowns.

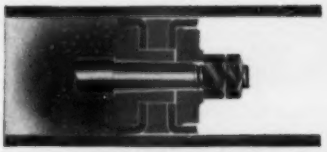
So if slippage is showing up in your operating and maintenance records . . . if replacement of packing is a too-frequent chore, that's your cue to switch to Darcova Pumcups.

For a free bulletin containing complete information, write, or use the coupon below.

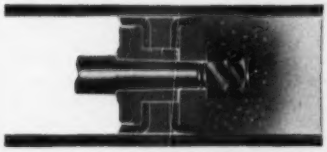
DIAGRAM OF PUMCUP ACTION GREATLY EXAGGERATED



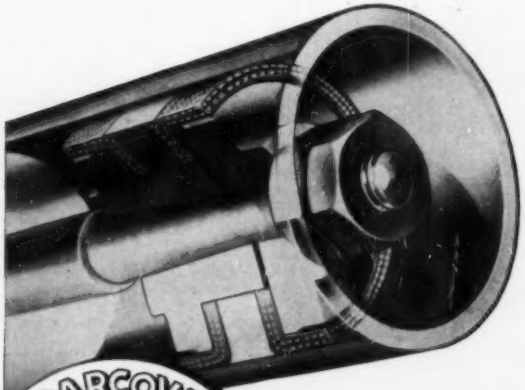
NORMAL: BOTH PUMCUPS RELAXED



UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE



Darcova Pumcups replace ordinary packing in reciprocating pumps and also in air or hydraulic control mechanisms. They are precision built of an exclusive, exceptionally durable composition material available in many textures for use with almost any fluid under a wide range of pressures and temperatures. Standard sizes range from ½ to 42 inches in diameter.



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The maintenance of expansion joints in difficult-to-service or remote locations is costly in both man-hours and shutdown losses. ADSCO *Corruflex* Packless Expansion Joints *eliminate* those costs by eliminating the causes. They never require packing or maintenance of any kind.

Corruflex Joints are on the job all the time . . . absorbing pipeline expansion and contraction resulting from temperature changes . . . protecting lines and equipment from undue strain.

And ADSCO *Corruflex* Joints are easy to install. Their compactness—with a maximum outside diameter scarcely larger than that of an ordinary flange—makes them ideal for use in trenches, tunnels or other cramped quarters where maintenance costs may be unusually high.

Like other ADSCO products, *Corruflex* Joints are built to the highest standards. They are available in sizes from 3″ to 24″, single or double units, single or multiple corrugations, with or without self-equalizing rings, and with flanged or welding ends. They are supplied in copper, stainless steel or other alloys and with internal sleeves if required.

Corruflex Joints have traverses ranging from fractions of an inch to 15″ and will operate under pressures from vacuum to 300 psi and temperatures from sub-zero to 1600 F.

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is how to avoid it. Preheat the edge of the metal with the tip of the preheat flame about $\frac{1}{8}$ in. above the surface until the line of cut for the full thickness has been heated to a bright red. Then back away from the work $\frac{1}{4}$ to $\frac{3}{8}$ in. Press down the cutting-

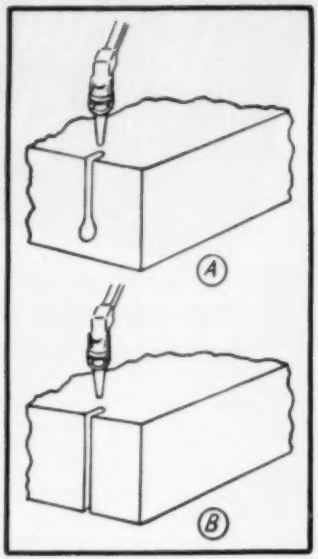

Fig. 1. To prevent pockets, get the cut started through the entire face before you press down the cutting-oxygen lever all the way

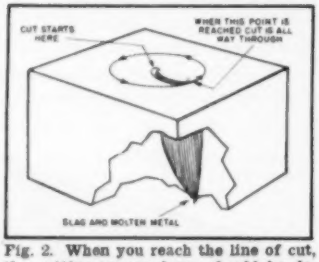

Fig. 2. When you reach the line of cut, the cutting-oxygen lever should be depressed all the way

oxygen lever slightly and with the nozzle at a slightly trailing angle lead into the cut slowly. Straighten up the nozzle as the cut reaches the bottom. Do not press down the cutting-oxygen lever all the way until the cut has traveled through the entire face as shown in Fig. 1B.

Mark the outline of the hole with chalk and a center punch. Start the cut in the part of the metal you will discard, in the case in Fig. 2, it is the center. Hold the blowpipe so the ends of the preheat flames are about $\frac{1}{8}$ in. above the surface. Heat the metal at this point until it almost melts, then gradually press down the cutting-oxygen lever. At the same time move the blowpipe, with the nozzle perpendicular to the surface, toward the chalk line. Regulate the speed with which you depress the cutting-oxygen lever and the speed of nozzle movement. In this way when you reach the

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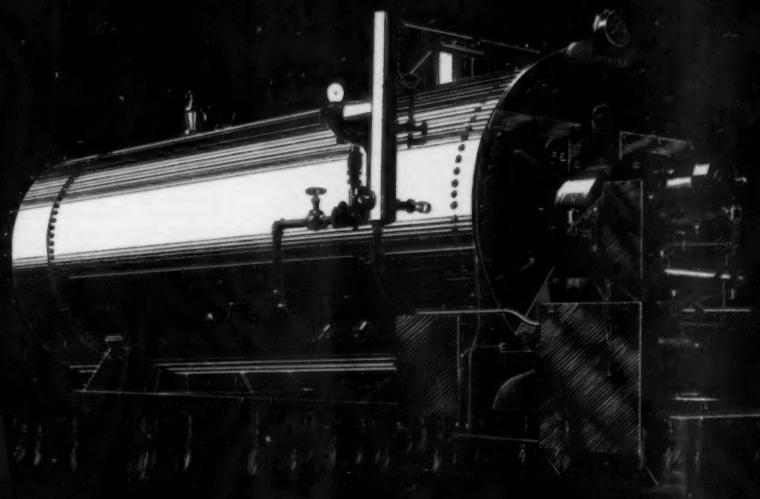

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starting point of the intended line of cut you will have pierced the entire thickness. By that time the cutting valve also should be depressed all the way.

Cutting Rounds—To start a cut on a round bar or shaft where there is no corner, first make a deep nick with a chisel and a hammer or sledge. The tip end of the sliver of metal will become red hot almost the minute the preheating flames touch it. This will allow you to get a quick start. *From Linde Tips, Jan. 1950, a publication of Linde Air Products Co., New York 17, N. Y.*

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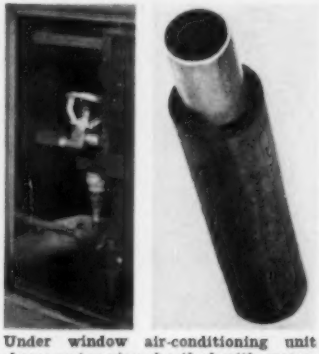
SPONGE RUBBER is being used in buildings to prevent condensation on feed and return lines. The rubber sleeves, molded to fit, can be slipped on easily. Besides speed of application and good



Under window air-conditioning unit shows water pipe sheathed with sponge rubber. Copper tubing with casing (right) presents seamless wall of rubber

insulating performance, sponge rubber sleeves have a further advantage in handling: where joints are made, the rubber sheath is pulled back to permit sweating the joint, after which the rubber is returned to its original shape to cover the completed joint. *From a news release of Sponge Rubber Products Co., Shelton, Conn.*

Fuel Consumption Reduced 10 Per Cent

A NEW YORK distillery reduced the fuel consumption of five marine type boilers by changing their burners from natural draft operation to forced draft. All changes were made by arc welding because of its low cost construction and enabling the distillery to keep the boilers in operation while the changes were being made.

The five water tube, marine type boilers were purchased from surplus and after installation, it was found that they consumed 10,000 gal of oil every 24 hours. Each boiler was rated at 250 hp and they were operated full capacity.

In order to increase the efficiency of the boilers, it was decided to change the burners from natural draft to forced draft operation. To do this, 3/16 in. steel plate was flame cut and welded

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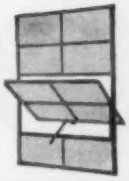

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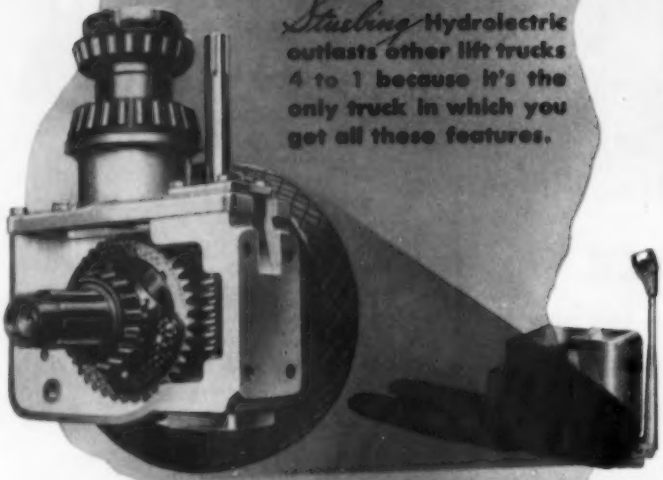

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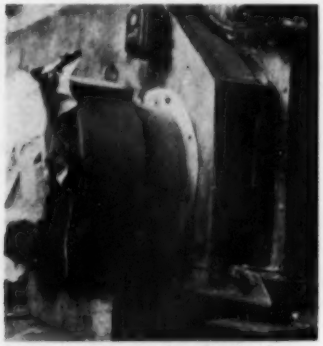
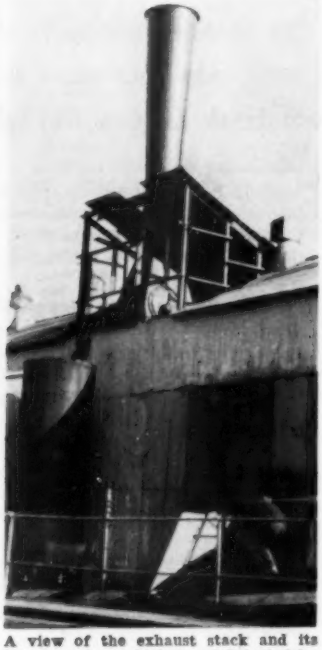
to form blower chambers around the burners. Large holes were flame cut in the plate to fit around the burners and to provide a seal for the chamber. Another large hole was flame cut for mounting the blower. Smaller holes were drilled for bolting the burners and blower to the plate.



Close up of air chamber showing blower housing mounted in position. Note that the air chamber is welded to the boiler and that the blower housing was fabricated by arc welding. Installation was made without shutting down boilers



A view of the exhaust stack and its blower system which was fabricated by arc welding. The stack and its blower weigh approximately 5 tons and required a complete new structure to support additional weight of the stack.

One other change that had to be made in order to convert these boilers for forced draft operation, was to provide a blower system in the exhaust stack to carry through with the forced draft operation. As it was originally, all five

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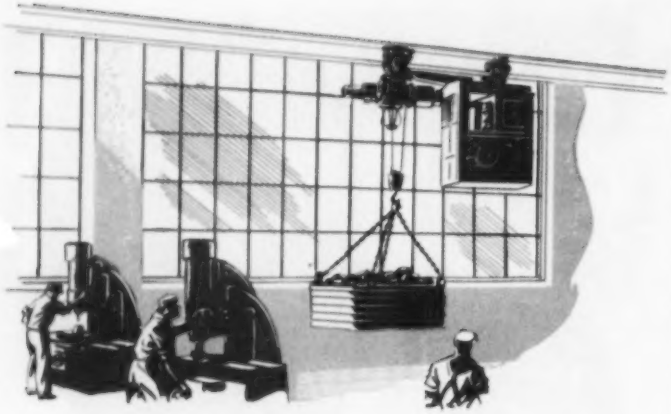

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fire boxes lead into one common natural draft steel exhaust stack 6 ft 6 in. in diameter and 90 ft high.

A new stack was installed in a structural steel frame of four 10 in. "I" beams and lighter cross members. The stack and blower, which is driven by a 20 hp motor, weigh approximately 5 tons. The stack is 30 ft high and is of all welded construction. To complete the job, corrugated aluminum sheets were used as a roof and to cover the sides of the frame. *From Hobart Arc Welding News, Vol. VI, No. 3, a publication of The Hobart Brothers Co., Troy, Ohio.*

Putting Asphalt Under Roads

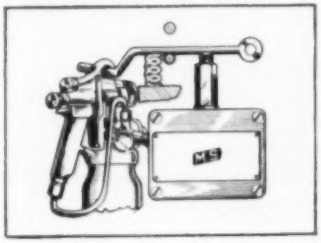
IT IS common knowledge to the majority of people that one of the principal uses of asphalt is in the paving of streets and highways. But few know that recently several state highway departments started using asphalt in another way. They are putting it under highways. The reason this is being done is to subseal rigid type pavements that have started to fail as a result of the seepage of water into the subgrade under the slab.

The first step in putting asphalt under concrete roads is the drilling of holes. An application of whitewash is placed around the holes so the spill-over of hot asphalt will not stick to the concrete surface, and thus permits easy removal of asphalt from surface after it dries.

The hot, liquid asphalt is then injected under pressure into the holes and fills cavities caused by erosion. After injection of the asphalt, the holes are plugged tight to prevent its escape.

The asphalt forms a foundation surface that will help prevent further deterioration. The small amount of asphalt that overflows the hole dries in a few minutes and is scraped from the concrete surface easily, thanks to the earlier application of whitewash. *From The Atlantic Magazine, copyright 1950, The Atlantic Refining Co., Philadelphia 1, Pa.*

Spray Booth Ventilation Control



In a paint spray booth an explosion-proof snap-action switch controls the circuit to the motor that drives the ventilating fan. The switch stops the fan motor when the spray gun is hung on a hook on the side of the spray booth. Removing the spray gun from the hook starts the ventilating fan motor. (From Micro Tips, Vol. 1, No. 5, a publication of Micro Switch, Freeport, Illinois.)

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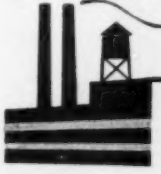

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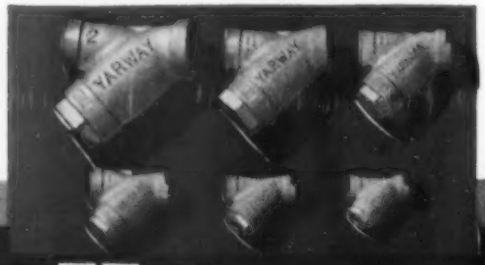

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FILES

Should They Be Resharpened or Not?

Can cutting efficiency be restored to files by resharpening or by sand blasting? . . . Here is a reasoned approach to the question by one of the country's leading file manufacturers . . . Under certain conditions it can, state the authors, but in others it's a good idea to watch your labor costs; they may mount considerably with lowered file sharpness

By Members of Research Department, Nicholson File Co.

PERIODICALLY the subject of restoring the cutting efficiency of old files is raised by file consumers. It is naturally a subject of considerable interest for it presents the possibility for tool cost savings.

A recent issue of PLANT ENGINEERING* carried an article entitled "It Pays to Sandblast and Resharpen Files." The obvious conclusion to be reached after reading this article is that all file consumers should have all of their worn files restored to full cutting efficiency and thereby make great savings. We have not found this all-inclusive statement to be true, and therefore want to point out the fallacies involved to those who have not previously considered the problem in connection with their own use of files.

The restoration of cutting ability to worn files may be divided into recutting and resharpening. In many cases the two methods are confused when they are discussed.

Recutting Process—Recutting is essentially the removal of the original teeth and the formation of new ones. The only saving in recutting of files is the cost of the steel and the shaping of the blank. If file quality is to be maintained the remainder of the processing must be identical with original manufacture. The savings effected would amount to approximately 15 per cent of the direct manufacturing costs for the average file provided it was feasible to approximate the original processes. These savings, however, are more than offset by the technical difficulties involved including small production runs, steels of various analyses and heats, and differences in sizes and shapes of blanks that are the result of the necessary reduction from standard sizes. There is no great saving to the file manufacturer in producing recut files over new files and therefore nothing to be passed on to the consumer.

While it is theoretically possible for a file manufacturer to turn out recut files with as good quality as new, there are practical limitations. Removal of the old teeth lessens the sectional size and weight of the blank. In most cases the original sectional size and weight is very important to the consumer. The ability to obtain the proper tooth structure is endangered during the recutting if the file becomes too thin, and becomes practically impossible on types similar to the Warding shape because the steel is not thick enough to receive the blow of the chisel without distortion.

The fact that no major file manufacturer in this country recuts files is the best evidence that it is not practical. The only concerns that recut files are small job shops where the standards of Grade A file manufacturers do not have to be met. The products of these concerns reflect this lack of quality and have never been accepted as being more economical than Grade A files.

Resharpening of files may be divided into two classifications: by sandblasting, and by acid.

Sandblast Resharpening—All files during the original manufacture are sandblast sharpened with a mixture of steam, silica, and sand. The blasting actually removes slight amounts of steel from the upper part of the teeth and in effect whets the cutting edges. The amount of blasting given newly made files is relatively small and the technique varies somewhat with the tooth structure and with the material the file is designed to cut.

During use a file naturally gets progressively duller. This dullness is a direct result of the amount of wear on the tooth tops. It can be compared in most respects to the dullness of a knife blade that has received a lot of use. In the process of properly resharpening by blasting the object is not only to restore the sharpness, but to accomplish it by keeping the distortion of the tooth structure to a minimum. Unfortunately, due to the multiplicity of teeth it is not feasible to direct a sandblast stream to certain areas of each file tooth, which would be necessary for the maintenance of the original and most efficient tooth structure. Within the mechanical limits involved, therefore, only the upper part of the tooth receives the blasting and this of course changes the tooth structure. The fact that tooth design is very important in file life and performance is well established, and it follows that the resultant change in tooth structure will lower the efficiency of file performance.

While some files are resharpened they only represent a minute percentage of files in use. This fact is primarily the result of two basic requirements for successful economy through reblasting. First the tooth structure of a file must be sufficiently large to be resharpened. The wear on average sized and small teeth is proportionately such a large part of the total size that considerable change in the basic shape occurs while the cutting edge is restored. Secondly, even files with large teeth if they have received normal to heavy wear do not resharpen as satisfactorily because, again, excessive tooth-shape change results.

The practicality of file resharpening therefore is based on the amount of sharpness that can be returned to the file without tooth design distortion.

These physical characteristics are tied in with the cost of a resharpened file as compared to a new file, and with the relationship between these costs and the cost of the labor using the file. It should be pointed out that a saving in file cost by using a resharpened file is always met by an increase in labor cost because the file is less efficient. It has been the experience of most of industry that has investigated the problem that the high cost of labor as compared to file costs makes it more economical to have fully efficient files in the hands of workmen.

In actual practice the general run of machinists' and saw files are not adaptable to economical sandblast resharpening while the chisel struck bodifiles and milled curved tooth files, used for the most part in the automotive industry, are successfully resharpened by this method.

Acid Resharpening—Acid resharpening is another method which is often advanced as a way to restore the cutting ability of a file. The process usually starts by placing the

(Continued on page 94)

* January issue PLANT ENGINEERING, page 50.

Tough Maintenance Problem Solved By Cooperation

Reduction of maintenance costs on large, automatic, high-voltage starting equipment accomplished . . . Maintenance budget based on production made reductions in costs imperative . . . Thus far, a savings of more than $8,000 annually has been realized . . . Plus values: reduced fire hazards, no welding of contacts, uninterrupted service

By G. L. CROSSETT, Maintenance Engineer, A. O. Smith Corp., and, CHARLES MIKOLIC, Control Engrg. Section, Allis-Chalmers Mfg. Co.

WITH THE ADVENT of increased amounts of automatic mechanical, hydraulic and electrical functions in heavy industry, we are beginning to realize more and more that the load imposed on the maintenance divisions is increased almost in direct proportion to the amount of such equipment installed. The maintenance engineers' headaches are further aggravated when the monies allotted for maintenance expense are based upon the total productive man hours required to manufacture the products involved.

When operating under such conditions it becomes a prime necessity to scrutinize maintenance and repair costs in an effort to keep operating expenses within the allotted sum.

At the A. O. Smith Corp. in Milwaukee, one of the most consistent costs proved to be, upon examination, the regular electrical maintenance required to service high voltage automatic starting equipment on two banks of high pressure hydraulic pumps, shown by the diagram, Fig. 1.

These pump banks consist of one bank of four piston type, 3,000 psi, 150 gpm reciprocating units each driven by a 300 hp, 3 phase, 2,300 v wound rotor motor and a second bank of four piston type 1,000 psi, 320 gpm, reciprocating pumps driven by a 250 hp, 3 phase, 2,300 v, wound rotor motors. Each of these pump banks feeds an air balanced hydraulic accumulator system which maintains the necessary pressure and volume of hydraulic fluid required for the operation of forming presses, welders, etc. used in the manufacture of fabricated steel products.

The individual pumps in each bank are arranged to start operating in 50 psi increments below the maximum high pressure required; the cut-in and cut-out points being controlled by adjustable pressure-operated electrical pilot devices. The heat developed by any single unit when subjected to frequent starting made it mandatory that any one pump and associated motor be changed to cut in or cut out on any of the incremental settings. This particular set-up was originally installed in 1929. Because of the pressures involved, the frequency of operation, and volume requirements, unloading valves of the proper physical size and stamina were not then available. Subsequent installations

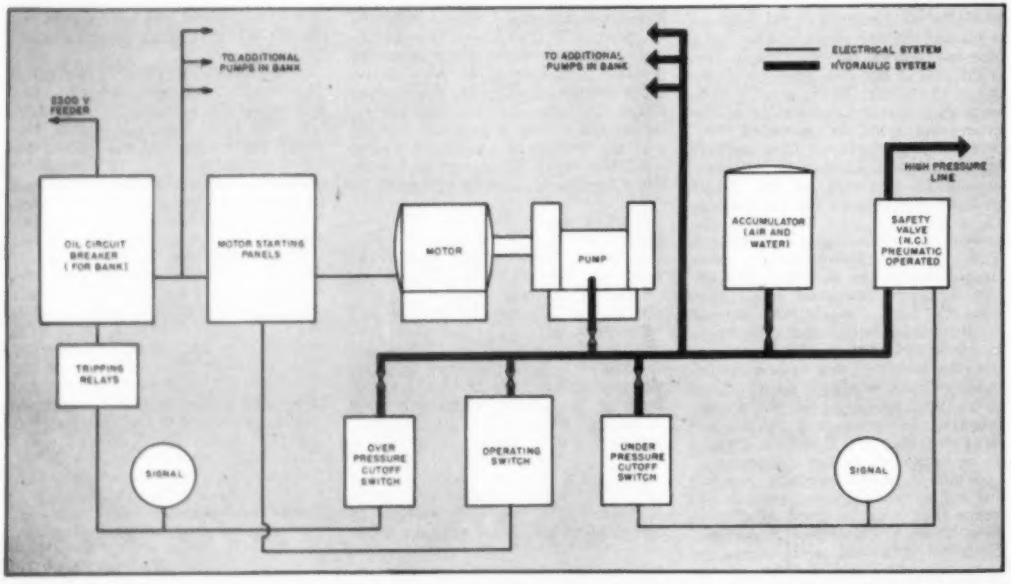


Fig. 1. Electrical and hydraulic equipment and lines for one of eight automatic starting equipment units at A. O. Smith Corp.

with pumps and motors running continuously, using valves for pressure control, have proven more expensive to maintain in the long run than an electrical set-up where the motors are started only when additional hydraulic volume and pressure is required.

With the increased production load, these systems have been operating 24 hr per day, seven days a week. Over a 24-hr period each pump averages 36 starts per hour or one start every 1.6 minutes; however, the starting cycle on the motor connected to the highest incremental pressure setting is even more severe. Hydraulic pressure fluctuations require the motor operating on this setting to cut in and out as often as every 48 seconds, while the time required for complete motor acceleration is 30 seconds. Using a set-up of this kind, the hydraulic pressure requirements may be satisfied before the driving motor has attained full speed, thereby causing the motor energizing switch to open under greater than full load current.

These conditions impose a great load on the 2,300 v, 3 phase, oil-immersed, solenoid-operated, stator-energizing switch. At times the heavy currents handled have caused the arcing contacts to freeze. When this occurs the hydraulic pressure rises above a predetermined safety setting, opening the main high voltage oil circuit breaker feeding all of the motor starting panels in one pressure group.

Short Life Halted Production

The major cause of the excessive maintenance cost was the short life of the oil contactor arcing tips and contact plates. The maximum life of these parts never exceeded 21 days of operating. This short life made it necessary to stop production at least every third week end for an eight hour period, to enable the electrical maintenance staff to replace the necessary worn parts and the insulating oil in the switches. At the end of a 21 day operating period the finest commercial grade of transformer oil was so badly burned as to make recovery by regular reclamation processes impossible.

The total cost of this necessary maintenance was approximately $1,000 per year for each starter, or a total of $8,000 for the complete installation of eight units.

It was of vital importance to find some feasible method of cutting down this excessive cost, and at the same time to find means of assuring continuous seven-day-a-week operation of these pumps.

Modern by-pass valve systems were first considered, but the idea was discarded because of past experience and the cost of new motors, starters, valves, and associated control equipment required. Several manufacturers of electrical equipment were consulted in the hope of obtaining longer insulating oil and contact life, even at the expense of installing higher capacity switches. These investigations produced no sound solution to the problem.

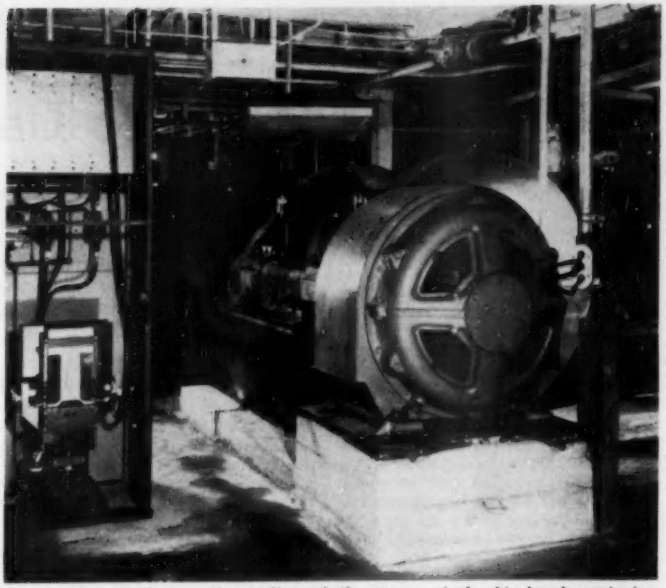


Fig. 2. One of the pumping units and the new control. Air break contactor is shown in starter high voltage cubicle. The 300 hp wound rotor motor drives the pump shown in the rear to maintain high pressure on hydraulic system

During this period, Allis-Chalmers had under development a high voltage air-break, solenoid-operated switch. Arrangements were made to try out, on an experimental basis, the first test model of these switches available.

This contactor, rated at 200 amp, 2,500 v, a-c, three phase, had the same capacity rating as the oil-immersed type then in service. The unit was installed in parallel with an oil-immersed switch with manual isolation switches providing a quick and convenient means of transferring the control to the regular unit for weekly inspections of the test model. The pump motor circuit having the highest incremental setting was selected to provide the most severe duty cycle possible, requiring the contactor to operate approximately once every minute.

As the test period progressed, the mutual benefits of this cooperative undertaking became apparent. The manufacturer obtained valuable data on the performance of the model and its component parts, in actual service under conditions impossible to duplicate in its testing laboratories. It had opportunities to find and to eliminate the inevitable "bugs" which always seem to hide in every new device. It also had a chance to observe and to improve minor details which normally would pass unnoticed in routine laboratory tests. Most important of all rigorous field service proved to them the basic soundness of design and of construction of a new device, radically different from accepted practice in several respects. On the other hand, the A. O. Smith Corp. at little expense, had the opportunity to observe closely, and to evaluate a new piece of equipment under operating conditions identical with those which had created such a costly maintenance problem. It was possible to ascertain the relative merits of a new and untried piece of equipment and the extent of its ability to eliminate existing maintenance difficulties before deciding to make any changes.

The performance of this test switch far exceeded expectations. After a 26 week test period and 156,000 operations, the switch was still in perfect mechanical condition and showed absolutely no perceptible wear on the contacts.

On the merits of the test, production models of the new switch have since been installed on new pump units. Figure 2 is a photo of one of these new installations, showing the pump, gear reducer, driving motor, and the electrical control cubicle. It is similar to the old units, with the exception of the new contactor, shown mounted in the lower, high voltage compartment of the cubicle. This switch is surprisingly compact in size, requiring approximately the same mounting space as the oil-immersed type. Small arcing chambers and a very simple operating mechanism make this possible.

The movable parts of the double-

(Continued on page 94)

PLATING FACILITIES
— Can Be Made to Last Longer

New construction methods and materials at RCA Victor Plant believed to solve many plating department headaches . . . Refinements of details, thorough investigation of possible products and their advantages, aided plant engineering . . . Plans, predicated on use of sheet metal, needed but slight changes . . . Initial cost high but replacement expected to lower cost appreciably . . . Details of new floor design and use of Koroseal . . . Isolation of motor-generator sets helps protect them

By R. F. McCAW, Plant Engineer, RCA Victor Division, Radio Corp. of America

MOST INDUSTRIAL plants employing plating facilities have, for many years, been seeking the happy solution to the corrosion problems encountered in plating departments. Our company was no exception. In our Camden plant, we have automatic platers and "still-tank" plating equipment. The corrosion problems are the same. However, they are more acute in the still-tank departments because of the nature of the operation.

Over a period of years, we have tried practically all of the commonly accepted materials on the market in an attempt to find those which would protect our equipment from the effects of rapid corrosion caused by acid and fumes. Many materials have been tried and the results have always been the same. The mortality rate was very high. Also, a vast number of so called acid-proof coatings were applied to plain black iron ducts. Again, without much success.

Recently, we started the engineering on a project to completely rehabilitate one of the largest of our various plating departments. This time, however, we decided to look for something new on the market, and to incorporate some innovations which would relieve us of the usual headaches experienced in plating departments. Accordingly, our design engineers were instructed to explore the plastics field completely, just to see what might be available.

After months of investigation we found a material which, we believe, is exactly what we were looking for. Our decision was made after some months of exhaustive research. This material is catalogued chemically as

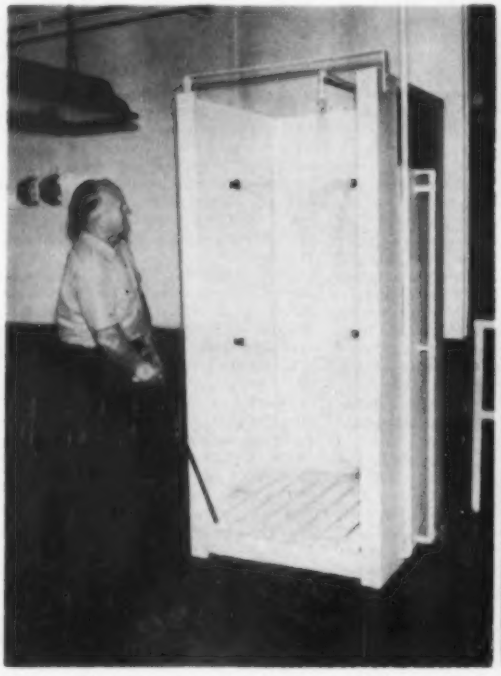


Fig. 1. Left: Automatic safety shower, provided as protection of employees working with acid solutions, is demonstrated here by pressing against the floor boards with a rod. Should worker accidentally come in contact with the acid he steps into stall where his weight instantly releases streams of water from seven nozzles. Fig. 2. Right: Plenty of room is provided around the drying centrifuge for the operator. Entire floor area beneath the duck boards can be flushed with water

a "non-plasticized poly-vinyl-chloride." Practically speaking, it is a plastic material manufactured in sheets, tubes, and light structural shapes, which can be fabricated into ducts, tanks, troughs, piping, etc., almost in the same manner as metal. It can be cut and machined like any plastic material, can be "welded" with a low-temperature flame, will withstand temperatures up to 175 F safely, and has a good, shiny appearance in its natural finish.

The product originated in France and is being developed and sold in this country by an American firm. It is apparently unaffected by most of the acids and alkalies commonly found in industrial plants, with the exception of certain hydrocarbons, esters, ethers, and ketones. The manufacturers claim that the material does not undergo the phenomenon of aging. This, in itself, explains the properties of the material very completely.

Our duct design had been predicated on the use of sheet metal, and all plans had been drawn accordingly. With only a few minor alterations, however, we were able to use these drawings for the fabrication of the plastic material duct work. Rectangular shapes are readily fabricated from the material. Round shapes can be molded if heat is applied. The various sections of duct can be flanged and bolted together, using Neoprene gaskets. Nuts and bolts made of the new plastic compound are also available.

Almost any pre-fabricated duct system will require some field alterations during final installation. This is readily accomplished with the new material—on the site—by the customary methods of sawing, drilling, and low-temperature welding.

This material is also flame-resistant, which, of course, makes it ideal for duct systems. Good housekeeping is encouraged by its smooth, attractive finish, and the fact that it requires no painting or polishing.

Our cost studies revealed that the initial cost of this system would run a little higher than other materials, but from a life-expectancy standpoint, the over-all cost of the plastic system is much lower.

Another application of the material which we have found to be most desirable is its use in the fabrication of containers for hydrofluoric acid. We have had "kettles"—complete with handles and machine-fitted lids—fabricated from the material, and they have proven most satisfactory.

So much for the duct work and the new plastic material from which it is made. In the matter of floor design, we adopted an entirely new method of handling spillage and drainage. We had formerly used the accepted method, involving a so-called "acid-proof" floor over the entire area, with drains located at various points. These floors had been constructed of heavy brick, which meant otherwise needless dead-load. We felt that if the proper slope was given to the areas immediately around each plating tank, the spillage could be diverted into a narrow tile-lined trench which would be easy to clean. So, we designed our new floor in such fashion that the individual tanks would be supported above the structural slab of the building on acid-proof piers. Under the tanks we built a lightweight sloping slab, pitched downward to narrow trenches located between the rows of tanks. The drains from the tanks were not dumped directly onto the sloping floor but were piped into the

Fig. 3. Plating operators working with chassis at passivating dip tanks. Note clean appearance of tanks, the light fixture directly overhead and exhaust ducts behind the tanks. Plans for sheet metal ducts needed few changes for new material

Fig. 4. Checking temperature of plating solution to insure proper reaction during the process. Again note exhaust ducts behind men. Material is acid and corrosion-resistant and is generally considered to be everlasting; it has a good natural finish

Additional information on the material used to build duct and other acid-resisting portions of this plating room will be forwarded on request to The Editor. Or, write "Plating Rooms" on the postage-paid card, pages 19 or 85.

trenches. This prevented a scouring action from hot solutions which are dumped periodically.

Other features incorporated into the new design included the following: 1. A glass cloth membrane, applied over the structural slab and coated with Trinidad asphalt prior to the application of ¾ in. hard asphalt topping.

2. Wood duck boards, constructed of 2 in. by 4 in. members with spacers between them, assembled in removable panels approximately 3 ft. x 6 ft.

3. Provision for removing sections of duck board over the trenches to afford easiest possible access to them.

4. A flushing system whereby one valve can be opened and an entire area underneath the duck boards can be flushed at regular intervals.

5. White acid-proof paint on all walls, columns, and other surfaces, to encourage good housekeeping.

6. All steel tanks, lined with Koroseal and designed with protective guards over their edges to prevent damage to the linings.

7. Either Koroseal or lead pipe lines between drains and trenches.

8. Overhead placement and open-type construction of all electrical d-c feeders.

9. Isolation of motor generator sets in small rooms where they can be properly ventilated, and where they will be completely protected from any stray acid or acid fumes.

In general, we have made all possible attempts to secure the very best in plating department facilities. While the initial expense is high, we know from past experience that the reduction in maintenance costs over many years will more than off-set the first cost. Further, we feel that the installation assures us our production will not be disrupted every couple of years to replace corroded duct work and other equipment.

SELECTION, USE AND CARE OF TOOLS

Punches—Many kinds, designed for different jobs. Some types are available in sets of assorted sizes

By THOMAS TRAIL, Maintenance Engineer

PUNCHES ARE made of the same types of tool steel as cold chisels. The better grades are forged from alloys possessing strength and toughness, and are carefully hardened and tempered to give them the best qualities for all around service. Medium grades are made of high grade carbon tool steel that will give satisfaction for most general work.

The principal types of punches include the Center Punch, Fig. 1, which is used to produce a center indentation for the guidance of subsequent machine operations, such as drilling, punching, bending, etc. Center punches are made in several sizes of stock, according to the size indentation required. Small and medium sized punches are suitable for most center punching, except where large holes are to be drilled.

In using a center punch, strike a very light hammer blow first, to produce a mark for checking correctness of location. When the proper location has been thus marked, deepen the indentation with a heavier hammer blow. A misplaced indentation may be corrected by holding the center punch at an angle so that the point points towards the direction in which the indentation must be moved, while applying moderate hammer blows.

The Sharp Point Punch has a much sharper point than the center punch, Fig. 2, and is generally employed for punching holes in sheet metal, for starting self-tapping screws and for similar purposes. It comes in several sizes similar to the center punch.

The Starter Punch, Fig. 3, is used for starting machine pins moving before applying a pin punch to complete their removal. This type punch is made in point diameters from 1/16 in. up. A starter punch should always be employed to loosen a pin, because its tapered design furnishes the required strength for this type of work. Due to its slender point, a pin punch is very likely to bend or break if used for this purpose.

The Pin or Drift Punch, Fig. 4, should be used to remove pins already loosened by the starter punch. Its long slender point is designed to follow the pin through the hole from which it is being removed. The starter punch cannot be used for this purpose because of the taper of its point. Some pin punches have their point tapered slightly from its largest diameter at the end to its smallest diameter at the shank, as shown in Fig. 6. This provides clearance to prevent the point from jamming in a deep hole.

Long Tapered Punches are similar to starter punches but have a longer tapered point, Fig. 5. These punches are used mainly for lining up machine parts for assembly and like operations. A similar tool is made in a much longer length but for the same general purpose.

Punches should not be abused by excessively heavy hammer blows. When using a starter punch or pin punch, select a size that almost fills the hole in the part from which the pin, rivet, etc. is to be driven. If too small a diameter punch is used, the end of the pin or rivet may spread and jam in the hole. If a punch seizes, do not try to loosen it by tapping sideways. This may bend or break the point. Instead, drive the punch backward with another punch, or hammer the pin or rivet back into the hole.

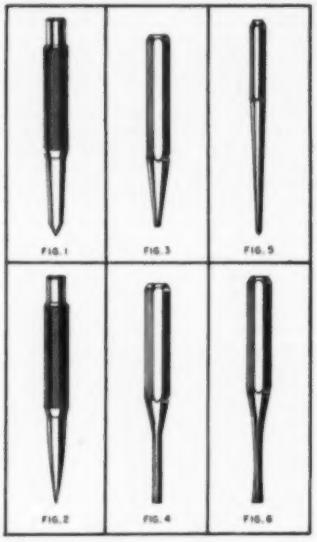


Fig. 1. Center punch; Fig. 2. Sharp point punch; Fig. 3. Starter punch; Fig. 4. Pin or drift punch; Fig. 5. Long tapered punch; Fig. 6. Reverse taper pin punch

Punches should be re-pointed with a file rather than a grinding wheel, to prevent their temper being drawn by excessive heating of the metal. Their original shape should be carefully maintained, to insure their continuing to perform the service for which they were designed.

Punches of the starter and pin types customarily are sold in sets containing an assortment of the most frequently used sizes. This is the preferable way in which to acquire such tools since it insures having the proper size punch at hand when needed.

Industrial Waste Pollution MUST Be Eliminated

Survey of the problems involved and of the various types of wastes included . . . What do these wastes do to our water supply? . . . Methods commonly employed . . . Need for plant surveys outlined . . . Advantages of waste recovery for reuse . . . When municipal sewers can be used . . . Public relations affected by policy

By R. W. SIMPSON, Sanitary Engineer, Gilbert Associates, Inc.

INDUSTRY IS becoming currently aware of the importance of the industrial waste problem. The fact that industrial waste treatment is a legitimate charge against the production of material is becoming more and more accepted by management today. Why this increased interest in the industrial problem?

First of all, industry is cognizant of the fact that both the surface and underground waters of the country are becoming more contaminated and less useful for industrial purposes. Secondly, governing bodies are continuing to enact legislation for the control of pollution.

Each year, industry is losing a large sum of money as a direct result of the pollution of surface waters. A second loss comes from corrosion within the plants themselves; a third loss is due to high cost of treatment for industrial water. And a fourth: Industrial waste may contain recoverable material which, when discharged to waste, a definite loss to the plant.

Industrial waste may be defined as any liquid, gaseous or solid substance, not sanitary sewage, resulting from the production or manufacturing of any industrial product. For simplicity, we may break down industrial wastes into four types: 1—acid or basic wastes, such as those discharged from steel mills and chemical plants; 2—organic wastes, such as those discharged from packing houses, dairies, chemical plants, etc; 3—oils and greases which may be discharged from refineries and packing houses; and, 4—inert material, in which class we can place coal collieries, sand and gravel quarries, etc. Most industries will fall in one of these categories.

The wastes from different industries affect streams in various ways. Acid or basic wastes reduce the natural alkalinity or acidity of a stream to a point where the water becomes corrosive and will not support normal aquatic growth. The use of this type of water by industry creates an undue hardship in that the water must first be neutralized before it can be used, and in many cases must be filtered and completely treated before it is satisfactory for process purposes.

Organic wastes, on the other hand, usually reduce the oxygen content of the stream to a point where it will no longer sustain aquatic life. Streams where the oxygen has been depleted give off obnoxious gases and again must be completely treated before the water can be used for industrial process purposes. Oils and greases contaminate the stream by imparting taste and odors to the water, reducing aquatic life, and again require that the water be completely treated before it can be used for industrial purposes.

Inert material, while less hazardous to aquatic life, still presents problems in that sludge banks are formed and suspended material is present which appreciably affects process waters again. It is apparent that if industry is to continue to use large quantities of water in production, these same industries must cooperate in reducing pollution in the streams so that they in turn will benefit by the waste treatment of others.

What methods are commonly employed in the treatment of industrial wastes? There is no standard or normal method of treatment—each plant must be custom-built for the particular industry it is serving. However, there are certain processes which may be applied to most of the plants in one way or another. Most industrial wastes require screening or sedimentation in order to remove floating or settleable solids. Simple screening or quiescent sedimentation is sufficient for a great many industries.

Material can be removed by screening which can be mixed with the raw material and again used in production. Sometimes, fine solids held in suspension in the waste can be removed by physical settling and

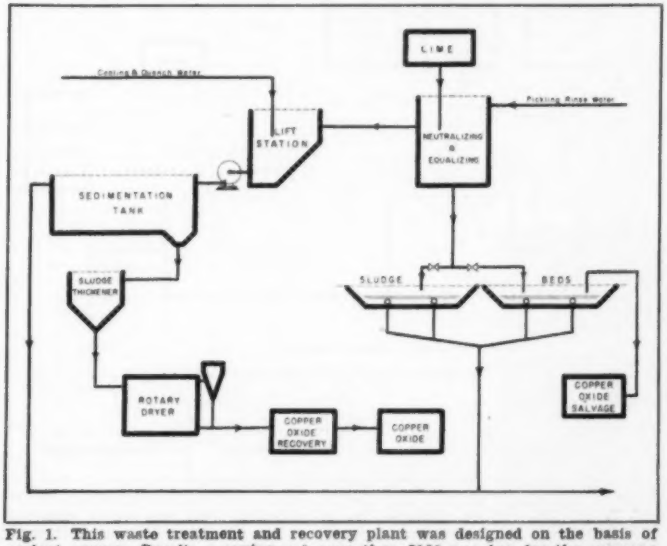


Fig. 1. This waste treatment and recovery plant was designed on the basis of a plant survey. Result: a savings of more than $100 per day for the company

recovered for sale as raw material for secondary products.

When sedimentation alone is not satisfactory, it usually is necessary to add chemicals to precipitate the undesirable material. Alum and iron salts are commonly used as coagulants, along with clay and activated silica, to assist or aid in the flocculation. Open lagoons, where sufficient space is available, can be used, or circular or rectangular settling tanks with mechanical sludge removal equipment, are quite satisfactory for this purpose. Where suspended material is very fine and will not settle readily, with or without coagulant, it is often necessary to follow the sedimentation process with a filter. This may be a mechanical pressure filter, a pre-coated filter or a standard sand filter commonly used in the treatment of water. The finer solids are thus removed; and the backwash from the filter has to be carried to the raw waste for subsequent treatment.

Where organic wastes are present, it is necessary, in most instances following sedimentation, to oxidize the organic material to a point where it will have no appreciable oxygen demand on the receiving stream. Oxidation of the organic matter can be accomplished by biological filters, in which event the waste is allowed to trickle down over a bed of stone on which a growth or slime of biological organisms has been built up. These organisms actually digest or eat the organic material present, giving off stable compounds and purifying the waste material. A second method of oxidation is by means of air blown into the waste.

In many instances, biological organisms are kept in suspension in the waste, as the air is blown in, so that two processes take place—biological oxidation, as well as chemical oxidation or the reaction of the oxygen present in the air with the organic compounds present in the waste. Anaerobic digestion of organic material is another method of waste treatment which is becoming more commonly used. Wastes resulting from the fermentation industry lend themselves readily to digestion, and this method proves an economical way of treating the waste. In this case, a large tank is provided, sealed to eliminate the presence of oxygen. Bacteria which work in the absence of oxygen actually digest or eat the organic material, again giving off end products which are not injurious to the stream.

Certain types of industrial waste are toxic, however, and do not lend themselves readily to biological treatment. Less commonly used methods, such as absorption of dye wastes or chemical conversion of one waste into another compound which can be recovered as a by-product, must sometimes be used.

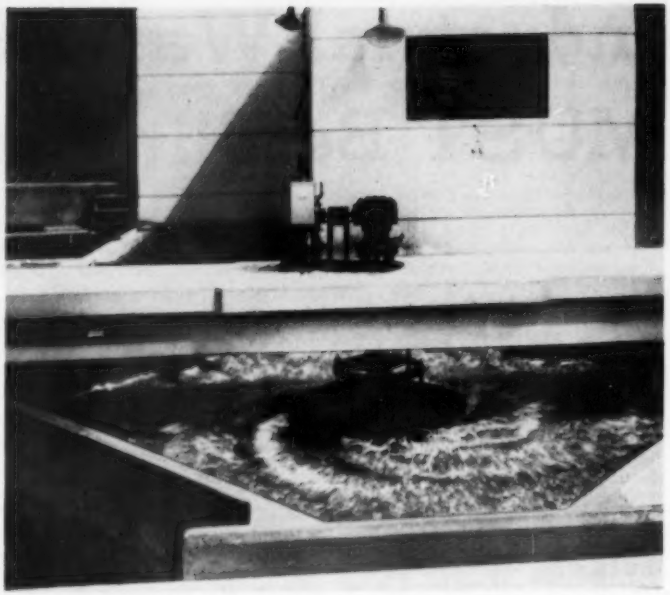


Fig. 2. Typical installation of an aeration unit for industrial waste treatment

Plant Survey Necessary

Before the method of treatment can be decided upon, there is certain basic data which must be obtained. A survey of the plant is essential in order to carry out an intelligent waste treatment plan. In this survey, a plant should first determine whether or not the volume of waste can be reduced. Many times, large losses of water can be prevented, which in turn will reduce the ultimate cost of treating the final waste. In other instances, by altering the methods of production, smaller quantities of waste can be obtained. Or less injurious or more easily treated wastes may result. When the basic volume of waste to be treated has been determined, it is next necessary to obtain samples of this waste for: first—chemical anal-

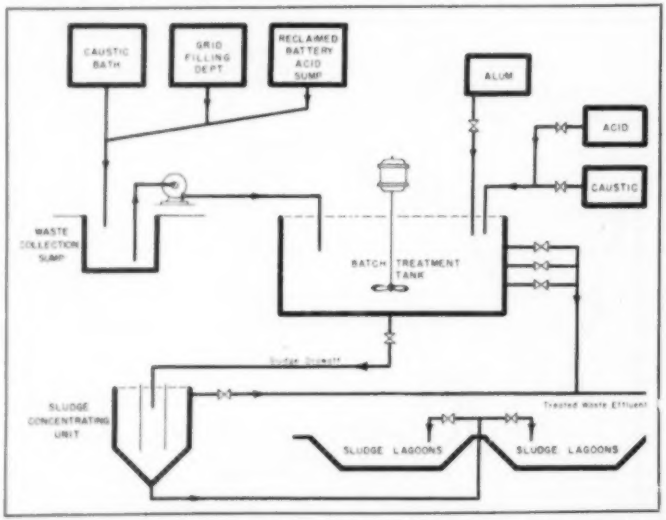


Fig. 3. No recoverable material can be obtained from the sludge resulting from treatment in this system but, in the course of study, losses of acid were discovered; elimination of losses resulted in savings attributable to survey

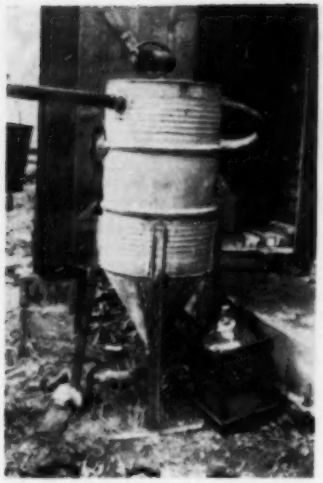


Fig. 4. Here is one type of pilot plant, installed by author, for studying settling characteristics of industrial waste

ysis and second — laboratory research to determine the most feasible method of treatment.

In most cases, the plant engineer is able to obtain the data necessary for an intelligent study of the waste problem. It is usually good practice to have the advice of a consulting engineer available so that the plant engineer can direct his activity towards obtaining the most important data relative to the problem.

Since there is limited scientific knowledge available on methods of treating industrial waste at the present time, it is usually necessary to install pilot plants in order to determine efficiencies available from various types of treatment.

In order to simplify the problem, many industries have banded together to form associations which are actively engaged in research on methods of industrial waste treatment and on methods of by-product recovery. A typical example is the National Council for Stream Improvement which is operated by the paper industry. The steel industry, in turn, maintains fellowships at Mellon Institute for research into economical methods of waste pickle liquor treatment. Considerable work has been done in the textile industry in this line also. Many large chemical plants have found it wise to maintain a staff of consultants within their own organization to study this important phase of process work. Industry is becoming so alerted to the industrial waste problem today that when a new plant is to be located, they are first interested in a source of water and secondly, the method of disposal of their waste materials.

Many industries are located in large municipalities and are able to discharge their wastes to a municipal sewer system. There are certain industries which can do this with no harm to the sewer system, while others must practice pre-treatment at the plant itself in order to avoid damage or trouble in the sewers and at the municipal sewage treatment works.

Pretreatment may consist simply of equalizing the discharge from the plant to the sewer system over a 24 hour period. It may be necessary to control the pH or the acidity or alkalinity of the waste by the addition of either acid or lime to prevent damage to the sewer system. It may be necessary to install screens to remove material which would very easily clog up the municipal sewer lines. In the case of the packing house industry, it is essential that grease traps precede the discharge of the waste to the sewer systems to prevent clogging of the sewer line with animal grease.

Plating industries must be careful not to dump large concentrations of cyanide and metallic salts into the municipal sewer system, or the biological activity at the sewage treatment plant will be reduced considerably. With an intelligent approach to the mixture of domestic sewage and industrial waste, industry can continue to use the sewer system. However, industry can not wantonly discharge any and all wastes without some sort of pretreatment, as discussed above.

Although industrial waste treatment is usually considered a liability by industry and management, many times a return can be obtained. The return can not always be measured in dollars and cents, since there are many intangibles involved; ultimately it seems to be quite valuable to industry to treat their wastes. In many cases of industrial waste treatment, it is possible to reduce the raw water costs and conserve a critical water supply. This can be done either by cutting down on the amount of water previously used in the plant or by subsequent treatment which produces an effluent or treated waste which can be re-used, reducing pumping charges and cost for purchased water.

By-product recovery should not be overlooked as a possible source of revenue from waste treatment. Reviewing the list of industries which normally produce wastes obnoxious and impractical for discharge to surface waters, we find many that can obtain valuable by-products by proper waste treatment. Perhaps the term by-product is not correct, since many of these mills recover materials which are re-used in the plant as raw material.

Paper mills, for example, can very easily recover stock for re-use in producing additional paper; latent heat can be recovered if the white water is re-used, thus increasing the production on the paper machines. Paper mills require a large volume of water; and by properly removing the solids in the white water, it is possible to re-use this white water on the showers, thus reducing the demand for raw water considerably.

Galvanizing plants may recover zinc, which has a resale value. Normally, however, the waste from galvanizing plants has few recovery possibilities. Canneries and vegetable processing plants are able to recover solids on screens very simply. This solid material which usually consists of pulp and seeds can be processed as cattle feed.

By-product recovery in the packing industry has many potentialities; recovery of blood, which is commonly practiced in large meat packing houses, certainly is worthwhile, since this blood brings a financial return. It is essential that grease be removed from the waste from meat packing plants, and this grease has high resale value. Solids removed from the waste in packing houses, when properly processed, can be used as a base for fertilizer. This again can bring a return to the industry.

The coal mining industry has recently become conscious of the losses of fine coal particles, and in the Pennsylvania hard coal area now,

(Continued on page 94)

Fig. 5. Weir for measurement of industrial waste discharge. Installations such as this were used in the survey preceding system shown in Fig 1

SAVE COMPRESSED AIR
Conduct a Plant Survey

Examination of your own plant may prove to you, as it did to the author, that changes to other than just the air system may provide lots of saved dollars . . . Habit is a poor companion for economy; check things which "have always been done that way" . . . Four concrete cases of savings outlined . . . Perhaps changes in air distribution system will permit use of small, portable compressors for maintenance or service work

By **WILLIAM J. O'CONNELL**, Process Engineer
Moraine Products Div., General Motors Corp.

IN THE MARCH issue, four major causes of compressed air wastage were discussed. Two other items were also found to contribute to the reducible expenses of operating a compressed air system, namely:

a. Use of air where another utility would do a better or cheaper job.

b. The expense entailed because of the complete centralization of the compressors without small, portable, stand-by units.

These items were mentioned in the March issue, but further details of the findings, described here, illustrate the facts uncovered, the recommendations made, and the results obtained.

a. Use of air where another utility would do a better or cheaper job.

It is a human tendency to revert to habit, and this tendency is apparent in industry. Therefore, the habit of using compressed air for a certain type of installation, regardless of a variance in requirements, will continue until a concerted effort is made to change this situation. Better or improved methods may be overlooked by the person responsible for such installations simply because "it has always been done that way." In the course of the survey at our plant it was noted that new, as well as old, installations were using compressed air when there were simpler and easier ways of performing the function.

Case 1: A series of sintering furnaces were using air from an air hose to blow off metal powder dust prior to sintering. A standard vacuum system was substituted for this with a rug type vacuum nozzle being used to pick up the dust. This not only replaced a more costly with a cheaper method, but made the job cleaner, and salvaged powder that had previously been allowed to blow away.

Case 2: A second instance of misplaced air-minded thinking was in the use of air to cool bits between cuts. The air installation was orig-

Fig. 1. Hangers on the right, labeled "Old", allowed the parts to hang vertically so that a puddle, which had to be blown off, formed on the inside diameter. When "New" hangers were installed the parts drained without blowoff. Photo was taken before the conveyor had been completely changed over; note the temporary blowoff nozzles at the left in photo

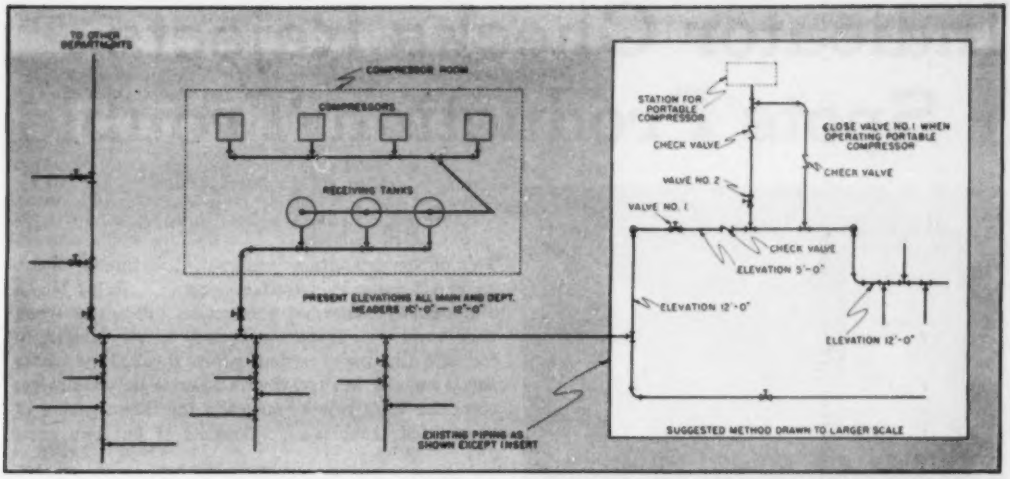


Fig. 2. As the installation now stands, valves which can be used to isolate certain sections are either non-existent or are inaccessible. Unshaded portion, enlarged at right, shows suggested method of rearrangement. Installation of valves 5 ft above floor, and locations for portable compressors, would be two changes to incorporate to improve operations

inally made to blow chips from the hole which was being bored without lubricant. At some time in the past the hole ran slightly oversize. Because this fault could not be attributed to any other cause, it was decided that an overheated bore bit was the cause. Air was therefore left to blow steadily, both between and during cuts. This was supposed to keep the bit cool. Actually, the length of time the air blew on the bit had no appreciable effect in cooling it. After the survey had been made and evaluated, it was recommended that a cam valve be installed at all such points to blow only during the cut, and to request the tool division to respecify tool limits on the bits. By doing this the bored hole is now kept within limits, and excessive air use is eliminated.

Case 3: One job, now in the process of being changed over, illustrates how a simple re-arrangement of physical equipment can effect a worthwhile savings in the compressed air consumption of a plant. As shown in Fig. 1, metal parts on hangers were passed through a washer and, even though the parts were hot enough to flash dry on nearly all parts of their surfaces, there was always a small puddle of water remaining on the lower inside surface.

Previously, we had a set of blower nozzles installed inside the exit from the washer in order to blow this remaining puddle of water from the part. A short study convinced us that simply by redesigning the hangers we could easily do away with compressed air use at this point and the puddle would roll off the surface of the metal part.

Case 4: Another instance of misdirected use of air, is its employment for drying metal parts coming from a washer or cleaner bath. Air, in this case, serves also as a cooling agent, so it can be readily seen that when a part is being dried, it is also being cooled, not a desirable factor. A much better method, and one that is already being used in certain installations, is the practice of recirculating hot air by means of a pressure blower that sends the air over steam coils before contacting the work. The advantages of this method of drying lies in the fact that the work itself is heated to a higher temperature by the drying medium, and this heat, as well as the air blast, operates as a dryer. Only where small holes require a hard blast or where space is a factor is compressed air a desirable medium. Washers mentioned in the first article (March) could not be converted because of such limitations.

b. Complete centralization of air compressors without small, portable, stand-by units.

One of the major causes of excessive air consumption, but, unfortunately, one about which nothing can be done in the present case, is the complete centralization of the compressor battery. For normal air usage it, undoubtedly, is the most economical arrangement, but unwarranted expense is entailed during periods of low air consumption such as weekends or shutdown periods when the only demand is for maintenance or service. Under the present piping arrangement a minimum of one compressor must be operated to supply this demand, which, although operated unloading, still must be operated continuously, also requiring the services of a stationary engineer.

A more economical arrangement, as shown in Fig. 2, and one that could be provided in the case of rearrangement or new construction, would be the ability by means of check or manual valves, to partition the plant-wide compressed air piping system into small, self-contained circuits. In each section, then, would be a location where a small, portable unit could be connected. This unit could be used for small, non-productive operations where now the entire system must carry pressure. For such operation a small unit would eliminate the need of stationary compressor stand-by use and resultant savings would be obtained.

Neither this article, nor the one preceding it, pretends to solve all, or most of the compressed air problems, except for a particular plant. It does, however, point the way. It is hoped that the illustrations have shown what is possible in the way of compressed air conservation, and what can be done when the faults are known.

THE DU PONT Company has granted royalty-free, non-exclusive licenses to seven companies to manufacture its newly developed functional office furniture (PLANT ENGINEERING, Feb., p. 48).

Designs under Du Pont's patent application for the development were made available for a token payment of $1 to these firms, which had expressed an early interest in manufacturing the equipment for sale to the public.

The seven concerns licensed are: Arnot and Company, Inc., Baltimore, Md.; Art Metal Construction Company, Jamestown, N. Y.; The General Fireproofing Company, Youngstown, Ohio; The Globe-Vernicke Company, Cincinnati, Ohio; Gunn Furniture Company, Grand Rapids, Mich.; Korda Associates, New York, N. Y.; and Remington Rand Inc., New York, N. Y.

Indicator Checks Rejects, Spots Production Trouble

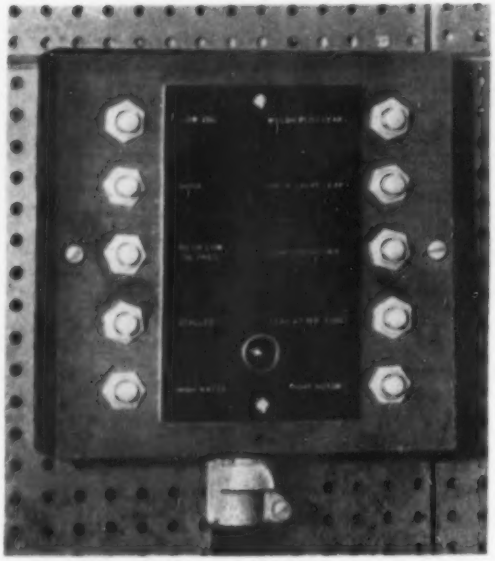


Fig. 1. Set of push buttons used by inspectors on refrigerator assembly line. The buttons, each one labeled with the name of a defect for which the inspectors test, are attached to a calculating machine which indicates on a meter when reject rates rise above a pre-determined level. Each button has a correspondingly labeled meter which is watched by supervisory personnel, usually at some central location

Fig. 2. This is a bank of meters to which the push buttons (Fig. 1) are attached. For quick visual perception of difficulties on line the meter face is divided into red and green segments. When needle hits red section the reject rates for that particular test must be too high, call for investigation

This device provides an automatic, continuous check on reject rates in manufacturing . . . Helps locate and remedy abnormal production difficulties when they occur . . . Inspector presses button labeled to indicate any one of various points checked for; these totals register in supervisor's office to indicate reject rate; too high reject rate calls for investigation of pinpointed troubles . . . Consists of but two units

Plant Engineering
Product Application Feature

A NEW DEVICE, which the manufacturer says can be instrumental in assuring the highest possible quality of most mass-produced items, and reduce manufacturing costs at the same time, has been unveiled.

The instrument, an electric computor which is called a "quality control indicator," keeps an automatic, continuous check on reject rates in manufacturing operations, and makes possible the location and remedy of abnormal production difficulties as quickly as they occur. The indicator is, at present, in operation on the General Electric Company's refrigerator assembly lines in the plant at Erie, Pa.

Statistical analysis of production and rejection rates in the past has been made by time-consuming computations, lagging behind production by hours or days. During such a lag, it is possible for an abnormally-high rejection rate to go undetected. Although eventually caught, these defective parts in the meantime have created irrepairable manufacturing losses and slowed production.

Eliminates Time Lag

The new instrument eliminates this lag. Essentially an electric calculating machine, it counts the number of items produced and the number rejected, and indicates on a meter whether the percentage of rejections is above or below an acceptable level at any given instant.

Two useful by-products of the indicators are fewer defective parts occupying space on the production line, with a resultant higher output for the same number of parts handled and greatly reduced scrap and rework costs.

Emphasizing the "in process" quality as opposed to quality of the finished refrigerator which always has had to meet high quality standards, L. H. Miller, Manager of the Division, said the reject rate on parts controlled by the indicator was cut more than 60 per cent in one trial installation.

On a compressor assembly line, this rate dropped from an average 2.7 per cent for a check of five characteristics to 0.89 per cent in six months in the pilot installation.

Button Pushing Changes Meters

In practice, the indicator uses various signalling devices, such as an "electric eye" or a switch tripped by passing objects, to count the number of articles produced. Every time an inspector rejects a unit, he pushes a button, and this causes a change of reading on the indicating meter. When the reject level at an inspection station exceeds a pre-determined rate, the needle on the meter moves from the green half of the scale to the red half, indicating to supervisors that corrective action is needed.

The indicating equipment need not be set up near the production line, but may be installed in the offices of supervisory personnel. At the test installation, engineers have set up a large, centralized instrument panel which indicates reject levels for each of several characteristics checked by inspectors on the refrigerator assembly lines.

"Every person working under this new system likes it," Mr. Miller said. "Neither supervisors nor assembly line workers like to see defective parts coming down the line, and the beauty of QCI is that as soon as trouble develops, we can spot it and act upon it."

Pinpoints the Trouble

Under any system of inspection, obvious troubles of course, are taken care of at once. But in any manufacturing process there are hundreds of not-so-obvious defects that are apt to show up first in rejection statistics, and then a search must be undertaken to find the cause of the difficulty. Under this new system, the rejection statistics are available instantaneously and automatically, and the manufacturer knows where to start looking at once.

The indicator may be used on any production line, wherever continuous inspection and testing are required. Manufacturers of automobiles, appliances, electronic equipment and other mass-produced articles should find it valuable for monitoring quality characteristics of their products. It can be applied to manufacturing operations where inspection is performed by automatic as well as manual methods. No additional production or supervisory personnel are needed to operate the equipment.

Total of Two Units

The basic equipment consists of two units: a "totalizer," which counts the units inspected, and a "characteristic analyzer," which counts the rejects for a given characteristic checked by inspectors. The "quality" meter, showing whether rejections are above or below a pre-determined level, is mounted on the front panel of the characteristic analyzer.

On the front panel of each characteristic analyzer is a selector on which the acceptable reject rate may be set. Reject levels ranging from zero to 10 per cent may be monitored. The quality level to be used is determined by previous production experience.

The characteristic analyzer is roughly the size of a shoebox; and the totalizer the size of a portable typewriter case. The equipment may be run on either 110-volt, 60-cycle alternating current or on 110-volt direct current.

Total Count Is on Dial

The count of the total number of manufactured articles inspected is given on a dial seen through a small opening on the panel of the totalizer, and the total number of rejections may be seen through an opening in the characteristic analyzer panel. At the end of a production of 2,000 units, the device may be reset.

In general, it is necessary to use only one totalizer for each production line, and a characteristic analyzer for each characteristic being checked for by any of the inspectors.

Readers who want additional information on this quality control indicator may have it by writing the editor or using the postage-paid card on pages 19 and 83. Just write "Quality Control" on the card.

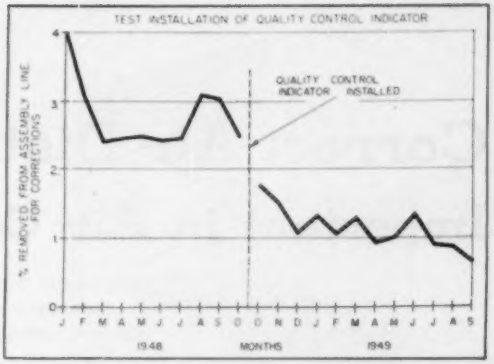


Fig. 3. This chart shows how the percentage of rejects on one manufacturing operation was reduced in a two-year test of the quality control indicator. In the past, time-consuming statistical calculations have been necessary to analyze reject rates thus lagging behind actual production

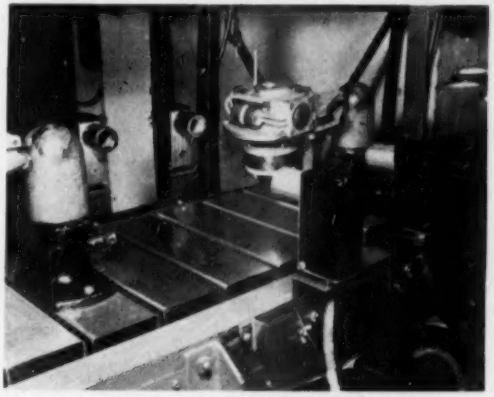


Fig. 4. Refrigerator compressors moving along this assembly line are counted as they pass between light sources, right, and the photoelectric cells, left, on either side of the line. The electric eyes count the number of articles produced and the inspectors press the button (Fig. 1) whenever one is rejected. These two impulses eventually actuate indicator

Fig. 5. Complete view of assembly line. The actuated indicator mentioned above, is located on a central panel (Fig. 2) which is watched by supervisors. These panels consist of many meters each indicating the level of rejects on line

Correct Air Distribution—

Important in Air Conditioning Systems

Advantages and disadvantages of various systems of air distribution . . . Case study of one large plant . . . Details of duct construction . . . Air velocities and types of diffusers used . . . Volumes of air handled

By **F. HONERKAMP**, Anemostat Corp. of America

AIR CONDITIONING made enormous progress during the war. The importance of producing high-class precision parts, of preventing spoilage and rejections and, finally, the need for speedy production, led to its widespread adoption.

Air conditioning and heating of large factory spaces usually are handled by one system. Heat may be distributed by radiators, steam unit heaters, direct-fired unit heaters or central warm-air installations with duct work.

As a rule, radiators find little application in industrial plants because steam distribution and control problems are difficult. Then, too, the air stratifies in the large areas involved and this causes great heat loss. In all plants where steam is available, unit heaters usually present an easy and inexpensive solution.

Propeller-type unit heaters with downward discharge have been used to advantage in buildings with low and medium high ceilings, but they do not always provide satisfactory air distribution. This is because high outlet velocities have to be employed in order to direct the air stream downward with sufficient force. This causes discomfort to the workmen beneath the heaters. Furthermore, the area covered is restricted.

The great advantage in the use of propeller fan unit heaters is that no duct work is required. Centrifugal fan unit heaters frequently require installation of ducts with special air outlets in order to improve the air distribution.

In plants where steam is not available or economical, direct-fired heaters for coal, gas or oil can be successfully applied. Such units occupy only small floor areas, are capable of firing efficiently, and are dependable and safe. They are used either as unit heaters or simplified decentralized heating systems with duct work.

Proper distribution of air in large buildings is often a difficult problem, especially in plants with large window areas, where heat losses from glass result in a relatively high temperature differential between supply air and the air in the enclosure. Ceiling outlets of large capacities are the only means of handling the necessary large air quantities. Buildings with high ceilings have successfully used systems with "aspirating" air diffusers.

Perhaps the best way to illustrate what can be done with air conditioning in a large industrial plant is to select a typical case. The factory of Bechtel, McCone & Parsons in Birmingham, Ala., is a windowless building that measures 720 by 1780 ft. It is divided into ten equal smaller sections each 160 ft wide plus three service bays. The center service bay is 80 ft wide and the two others are 50 ft wide. Height of the space from the floor to the bottom of the chord of the roof trusses is 40 ft. The service bays are lower than the main sections and have machine shops on the first floor and offices on the second.

The building is heated by 18 direct-fired unit heaters. Each heater has a capacity of 6,000,000 Btu, is fed by a bin-feed coal stoker and equipped with a fan of 75,000 cfm, driven by a 60 hp motor. Total capacity, therefore, is 108,000,000 Btu. Heaters and their accessories are placed in batteries of three in the basements of the service bays near the side walls of the buildings. This arrangement permits a simple duct layout and eliminates high friction bosses.

Each of the six heater rooms has two air shafts, approximately 10 by

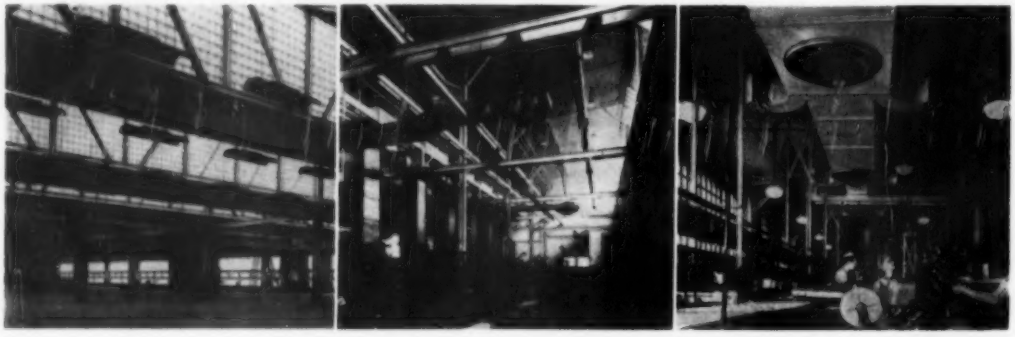


Fig. 1. Air diffusers may be used in many different ways to fit the particular problems at hand. Photo at left shows interior of business machines plant; note the method of supporting ductwork. Picture in center is General Electric Co. plant at Pittsfield, Mass. Air diffusers draw in 35 per cent of the room air and mix it with incoming supply air. Photograph at right shows air diffusers and ductwork over a chocolate enrobing production line in a Chicago candy factory

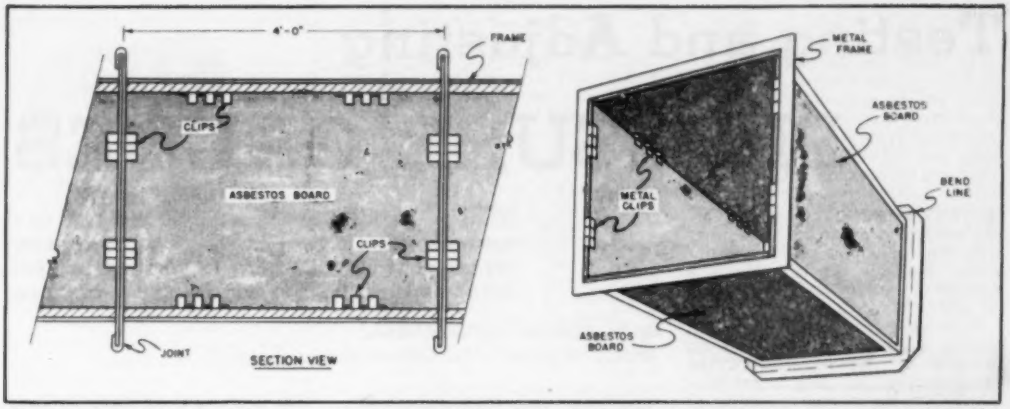


Fig. 2. This method of making connections in non-metallic ductwork obviates drilling and does not apply strain to the material. Furthermore, the entire ductwork system can be pre-fabricated in the same manner as many piping systems

17 ft which extend above the roof to small penthouses equipped with louvers. The percentage of fresh air taken in by the heater room fans can be varied to any desired amount and air can be entirely recirculated or 100 per cent fresh air can be used. Heaters and fans are in the same plenum chamber which is, of course separated from the firing room to prevent contamination of the heated air by dust and coal.

Duct work in the plant is non-metallic. Asbestos cement board, 3/16 in. and ¼ in. in thickness was used and ducts were fabricated on the job. This is one of the most interesting features of the whole installation. Authorities, charged with the responsibility for this job, visited several installations to find what problems might be encountered in the erection of the non-metallic ducts. It was found that devising a method of fastening the boards, so they would not get broken in making holes for sheet metal screws might present difficulties. Another possible source of trouble involved finding a method of fastening which would prevent the asbestos board from being subjected to any strains after erection. The Lumm panelled connector was decided upon, this type of installation being satisfactorily used at a large Army Depot in Toledo.

Briefly, this consists, as shown in Fig. 2, of frames or panels in which the non-metallic board is fastened by means of clips. These panels are riveted together to form a frame like a picture frame. Metallic clips are spot-welded to the frame to hold the asbestos board. The frames are made of 20 to 22 ga material, so that the weight of the metal is low. The net result is that the sheet metal worker simply slips the proper size non-metallic board into the clips after riveting the frames into square sections 4 ft long. A reinforcing flange at one end of the 4 ft section bends over and locks with a flange on the next section, making a tight, leak-proof joint extending around the four sides of the duct as a reinforcement. The joints are then caulked with plastic cement along the inside seams.

By this method the panel of non-metallic material is not drilled, nor is it under strain of any sort. It is free to expand or contract in its own section or framework. In this way a non-metallic ductwork job can be laid out carefully, like pre-fabricated piping, each section marked for its proper place, and assembled with little labor and practically no danger of breakage. Other methods of fastening require careful handling, in spite of which some breakage occurs. Also other methods of fastening with corner angles require diagonal cross wires at each end of each section to hold it together, thus introducing more resistance to the flow of air in the ducts.

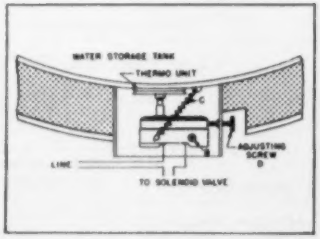
Heating of the ten main sections is independent of the offices and the machine shops in the service bays. Ducts for the main sections run through the trusses or steel superstructure, 48 ft above the floor. The specifications required that no heating equipment should occupy any of the space in the main sections below the roof trusses, 40 ft across the floor.

A total of 160 aspirating air diffusers were installed in the main sections of the plant and were mounted at the bottom chord of the roof trusses. In order to avoid stratification and to uniformly distribute air over the whole area, the neck velocity is over 2000 fpm. Units used had neck diameters ranging from about 20 in. to 30 in. Each unit supplies air in quantities of from 5000 to 10,000 cfm.

In the offices on the second floor of the service bays, the air is distributed by a different type of diffuser. In addition to the outlets used for distribution of the heated air in winter, additional outlets for ventilating purposes in summer were necessary in order to handle the increased air volume (ten changes per hour). The heater fans are used to help carry this summer ventilation load in space occupied by large number of workers.

In the offices of the 80 ft bay, for example, about 75,000 cfm of air are handled during the winter months, whereas 190,000 cfm of air are handled during the summer months. Of this amount about 84,000 cfm are distributed by the additional ventilation outlets and 106,000 cfm by the "heating" outlets which in summer, of course, also handle ventilation air. Nearly 300 aspirating diffusers are installed in the office space.

Temperature Control for Hot Water Storage Tank



An extremely sensitive temperature control for a gas heated hot water storage tank consists of an ether filled thermostat wafer and a normally-closed snap-action switch. The switch "B," with a spring "C" holding the switch against adjusting screw "D." Temperature rise expands wafer to operate switch to open the circuit to the solenoid valve which shuts off the gas. On cooling the wafer contracts, relieving force on switch plunger, closing the circuit and turning on the gas. (From an article by C. A. Burmeister, in Micro Tips, Vol. 1, No. 5, a publication of Micro Switch, Freeport, Illinois.)

Testing and Adjusting

PRESSURE GAUGES

Where to install and how to install . . . How to fit up a test work bench in the plant . . . Removal of gauge and procedure of test . . . How to adjust for long and short travel . . . Cleaning and reassembly of gauges

By W. ELWOOD ROSSNAGEL,
Safety Engineer, Consolidated Edison Co. of N. Y., Inc.

EVERY MEMBER of a plant engineering department is familiar with the common type of pressure gauge, but this article presents a number of pointers which may prove of value.

A pressure gauge is an instrument used to indicate liquid, vapor or gas pressure or vacuum. Behind the glass-covered dial is a metal tube which is flattened and curved so as to make an arc of about 270 deg. One end of the tube is anchored in position, and by means of a port it is connected to the male threaded stem of the gauge. The other end of the tube is sealed and attached to a linkage, gear segment, pinion, shaft and hand or pointer.

As pressure is built up within the flattened (Bourdon) tube, this tube tends to inflate and assume a more nearly circular cross-section. In so doing, the tube straightens out slightly, and it is this microscopic movement which causes the pointer to move around the dial by means of the links.

A pressure gauge should always be mounted in a vertical position on the pressure vessel or on the adjacent piping. It is customary to place a cock in the piping directly ahead of the pressure gauge so that it can be readily removed for test without lowering the pressure on the vessel. When the vessel contains both a liquid and a vapor or gas, the gauge should be located above the liquid level.

The pressure gauge should always be removed before a pressure vessel is given a hammer test while undergoing a hydrostatic pressure test as the shock from the hammer blow will be transmitted by the liquid and may damage the gauge.

A pressure gauge should always have a range of about twice the normal operating pressure; in other words, under normal operating conditions the hand should point approximately in the vertical position. If for any reason the pressure should be built up sufficiently to cause the

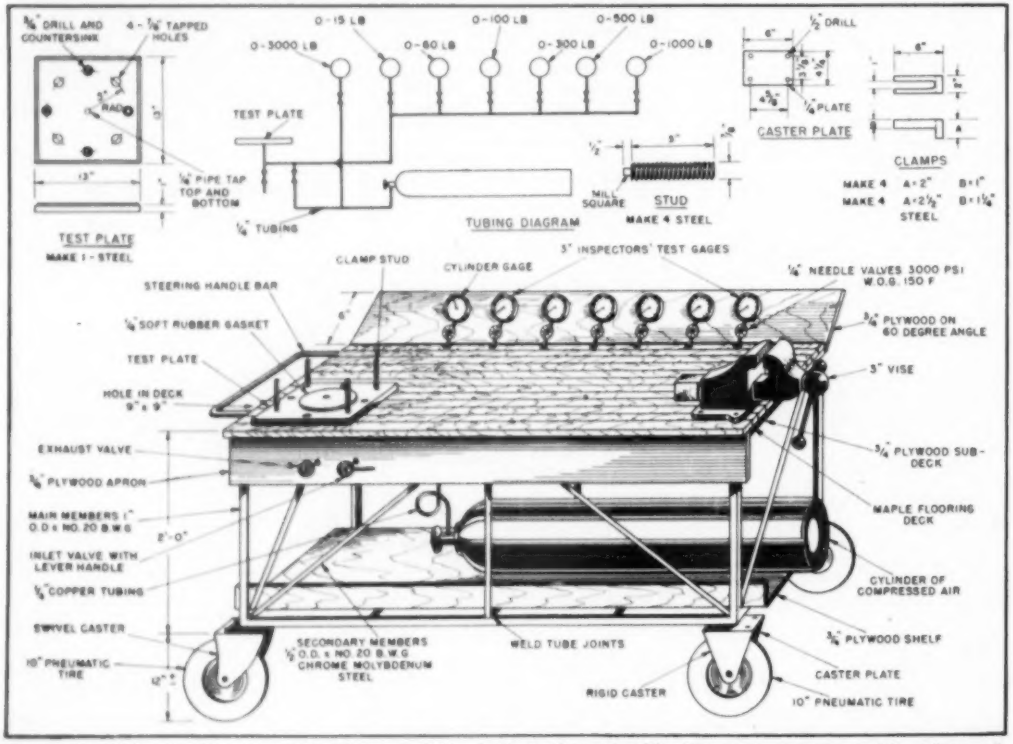


Fig. 1. Detailed instruction for constructing a work bench for testing and calibrating pressure gauges, safety valves and similar instruments and accessories. Small compressor can be used instead of bottled air; pressure should be about 2000 psi

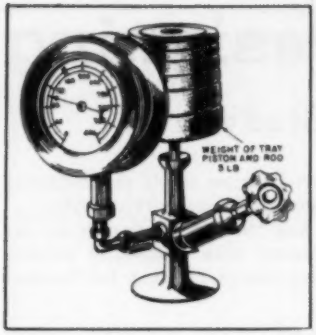


Fig. 2. An alternate method of testing pressure gages is by use of the dead-weight tester which builds up pressure with weights, oil and pump

pointer to approach the limit of the dial, there is a possibility that the gauge will be rendered inaccurate. In such an event the gauge should be recalibrated.

If conditions warrant the installation of a pressure gauge, they should warrant keeping it in accurate condition. Therefore, all pressure gauges should be tested at least once a year regardless of the service they are in. When subject to vibration, corrosion, over-pressure, sediment, etc., they should be tested more frequently, possibly monthly or weekly.

Testing can be done by the plant personnel with a little training and without the investment of such money. Therefore, there is little excuse for not keeping all pressure gauges in accurate calibration.

A work bench can be fitted up with the necessary system of ¼ in. copper tubing and supplied with compressed air at a pressure double the highest operating pressure of any vessel in the plant. If a small test compressor is not available, it is possible to use bottled air at about 2000 psi. A number of test gauges (extremely accurate gauges), each with a pet cock below it, should be connected up on the test bench, and a needle valve with a 4 in. handle should be installed on the air supply line.

Perhaps a cheaper and more accurate method is to procure a dead weight pressure gauge tester which utilizes lead weights of various sizes and a small hand pump to build up the required pressure. This method, however, will be found much slower than with the test bench.

When a certain pressure gauge is to be tested, the inspector or mechanic goes to the location, and after securing permission from the operator in charge, closes the cock under the gauge. He then very carefully unscrews the gauge a thread or two until the pressure is allowed to bleed off. When the gauge is in steam, hot water or acid service, care should be taken to protect one's self from being burned by the escaping fluid. When removing the gauge, use a wrench on the square base; don't unscrew by pulling and pushing on the gauge body. In transporting the gauge to the test bench, care should be taken not to be burned by acid or hot water dripping from the tube.

In the test room the gauge is screwed into position on the test bench, or on the dead weight tester, and the readings on this gauge, when various known pressures are built up, are noted. They should agree very closely. If they do not, it is necessary to readjust the gauge.

Remove the glass or plastic protection from the front of the gauge; then remove the hand by means of a "hand puller" similar in operation to an automobile wheel puller; and, finally, remove the dial or face of the gauge.

If necessary to open up the gauge, it will be worth while to spend a few additional minutes to completely service it. Remove the movement piece by piece and dip in trichloroethylene, dry in the air, and reassemble. To lubricate the bearings, apply a little powdered graphite with a wood toothpick or pencil-shape piece of wood.

If the gauge hand, before removal, did not just gently touch the stop pin at the zero end of the dial with zero pressure but did read accurately at the high end of the scale, or vice versa, adjustments will be necessary. If the travel of the hand is too short, the dimension "A" in Fig. 3 should be shortened. If the hand travels too far, this dimension should be lengthened.

By running the gear sector off the pinion, rotate the latter so as to give the hair spring just enough tension to take up any slack in the linkage and gears. Link "B" is only adjusted as may be found necessary to keep the sector from running off the pinion, and thereby to reduce to a minimum the angularity of the sector lever and the link.

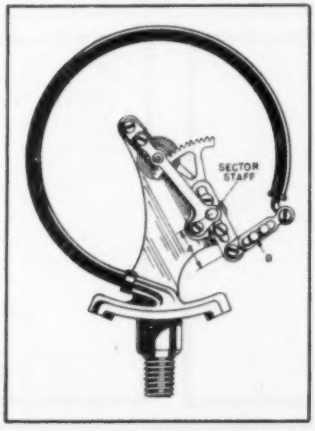


Fig. 3. Method of adjustment for over and under travel is explained in text

Replace the dial and build up a pressure on the test gauge which is exactly half the range of the scale of the gauge being tested. Then press the hand onto the shaft of the gauge so that it reads correctly the same as the test gauge. Readings are then taken at four or five points on the dial, say, 0, ¼, ½, ¾ and full reading on the scale. If there are any errors in the readings, it may be necessary to remove the dial and make further adjustments as described above. Final readings should be made at the zero, ¼ and ½ readings on the scale.

For average service an accuracy of plus or minus 1 per cent should be maintained. When the gauge is satisfactorily calibrated, mark the date in pencil on the dial, replace the glass, and the instrument is ready for service. A record should be kept of the final test on the gauge, including the corresponding readings of the test gauge and the tested gauge. If major repairs are required, the gauge should be returned to the manufacturer.

A pressure gauge is a sensitive instrument and should be handled accordingly, never dropped or carelessly laid down. It should always be mounted right side up and preferably on the highest part of the equipment. Never use oil on a gauge, particularly if it is to be used for oxygen or high pressure air service, as spontaneous ignition of the oil may occur. In service a gauge should not be used for pressure exceeding one-half the range of the scale.

A NEW METHOD of replacing cracked or worn metal tires on kilns, coolers and driers has been developed by Stroh Process Steel Co., Pittsburgh. This method of tire replacement, which reduces production losses due to down time, is based on the use of a diagonally cored split tire. By means of interlocking machined mating surfaces in the rim, this tire can be positioned in the field without tearing out a section of a shell or disturbing the shell's existing alignment. After positioning, the split is welded to make a full, solid ring, which has no machined bolt-head mating surfaces to loosen up under load and heat. The weld metal at the splits does not "hump up" and the tire rolls smoothly over the welded joint.

The only machine work required on the ring, over and above that of a solid ring, is the planing of the interlocking machined mating surfaces of the rim. This eliminates much expensive machining to close tolerances, necessary on conventional four segment split tires. Easier installation of the diagonally cored design is achieved, since a kiln operator can normally handle a half ring with existing equipment.

Plant Washroom Designing

A Personnel, Traffic, Maintenance Study

Minimum requirements must be met but, if you can do better, it will pay dividends . . . Determination of minimum fixtures and location of personal service rooms . . . Scattered versus centralized rooms . . . Traffic flow through washrooms an important consideration . . . Good ventilation necessary with mechanical exhaust systems the best bet . . . Color harmony provides change of scene for workers

By W. H. DeVORE, Director, Washroom Advisory Service, Scott Paper Co.

THERE IS ABUNDANT evidence that industrial plant employees are just as demanding of health protection and adequate sanitary facilities at work as they are at home. This is a good sign because cleanliness is so essential to civilized living and modern industry. Only healthy workers can provide continuous individual and collective effort, without which efficient production would be difficult. The basic factor in employee health protection is the personal service room, where the individual cares for his hygienic requirements.

The term personal service room applies to washrooms, toilets, locker rooms, shower rooms and rest rooms. Surely these rooms should be symbols of sanitation and good health and lend themselves to low-cost maintenance.

It has been a fallacious and costly practice in the past, to shunt washrooms into small areas, inaccessible locations and impractical places because no other space was available after plans had accomodated production areas. Is it any wonder they were destined to be non-productive, dismal and odorous before they left the drafting board? Assigned adequate and proper areas in the plant they can be productive, even money-makers. Basic considerations in planning personal service rooms are determined by State Sanitary Codes, plant or department population, plant area, efficient maintenance and employee morale.

Any planning must start with the minimum requirements stipulated in your State Code of Sanitary Regulations. Since only minimum standards are set forth, any degree in which they are exceeded will be to the good. As an example of what would be considered minimum, a partial listing of fixture ratios to population as recommended by the U. S. Public Health Service is presented in Table I.

Upon determination of the number of fixtures to be provided according to your State Code, shall they be installed in centralized or scattered personal service rooms? Distance from the work station to the washroom is an important consideration. Washrooms serving work areas beyond a 125 to 150 ft radius are generally impractical and uneconomical. The employee's discomfort and time lost walking from remote points must be considered. Man hours saved by proximity to work stations can aid substantially in amortizing costs of new rooms.

Small plants often find it practical to centralize personal service rooms because the remotest work station is within practical radius. In some industries such as oil refineries, chemical works and shipyards, proponents argue for centralization, contending the locking of such rooms during work periods reduces the danger of thefts.

Centralization in large plants, however, means that many auxiliary toilets and lavatories must be distributed. Auxiliary rooms require just as diligent care and maintenance as larger rooms but unfortunately the tendency is toward laxity. Evil-smelling, dirt-breeding holes in the wall result. The obvious concentration of large groups during shift changes is conducive to

The American Standard Plumbing Code, ASAA 40.7, 1949, published by the American Society of Mechanical Engineers and jointly sponsored with the American Public Health Association is a desirable reference work for washroom planning.

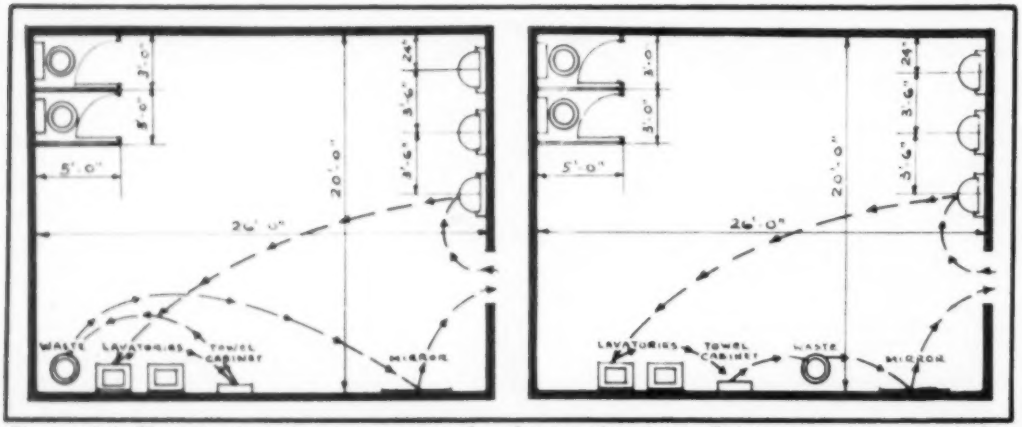


Fig. 1 and 2. Illustrating how minor rearrangement of washroom equipment can effect improvement in room's traffic. In Fig. 1, cross traffic results when waste receptacle is placed at left; note improvement when it is moved to the right

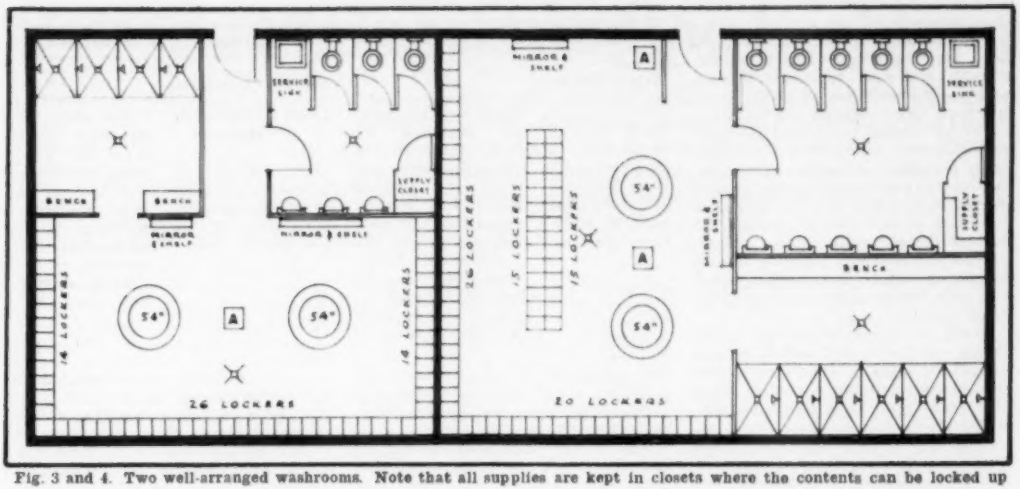


Fig. 3 and 4. Two well-arranged washrooms. Note that all supplies are kept in closets where the contents can be locked up

congestion, and mob psychology. The latter facet tends to lessen the employee's sense of responsibility, with property and services suffering from inordinate abuse.

Scattered personal service rooms, serving departments or work areas within the prescribed 150 ft radius, permit a high development of community or departmental spirit because lesser groups are more manageable and the employee feels more conspicuous in his use of this, his personal service room. A cooperative effort to preserve the room's appearance in conjunction with close supervision of the janitor's work is more than a possibility. Shift changes find no huge concentrations but rather well-dispersed and controllable groups. Congestion and confusion may be reduced to a minimum.

The trend toward large one-story plants with production and assembly lines streamlined places a premium on floor space. Washrooms on mezzanine floors are a practical solution. However, it is important that such rooms be just as carefully designed as if located on the production floor. Too frequently they are hot and poorly ventilated, badly lit and acquire a loft-like atmosphere. Such planning is costly and unnecessary.

Space allotment is dependent not only on number, type and dimensions of fixtures but their proper placement. Figures 1 and 2 illustrate the concept of proper fixture placement so as to draw the user progressively from each facility to its successor and on to the exit. Note that a simple rearrangement of the waste receptacle from its position shown in Fig. 1 to that shown in Fig. 2 changed the room's traffic pattern from confusion to smooth traffic flow. Cramping or crowding facilities which is contrary to this procedure will prove costly.

Figures 3 and 4 picture small combinations of locker, shower and washrooms. Note that facilities again are so placed for easy traffic flow and ease of maintenance, even though the room is more complex than Fig. 1. Circular washfountains in the locker rooms are convenient to toilets also. At a proper distance from the washfountain, a combination towel dispenser and waste receptacle of the floor pedestal type (A) is located. Note that mirrors with shelves are near the exit, and note the inclusion of supply closets and service sinks in locked compartments. Supplies and cleaning ma-

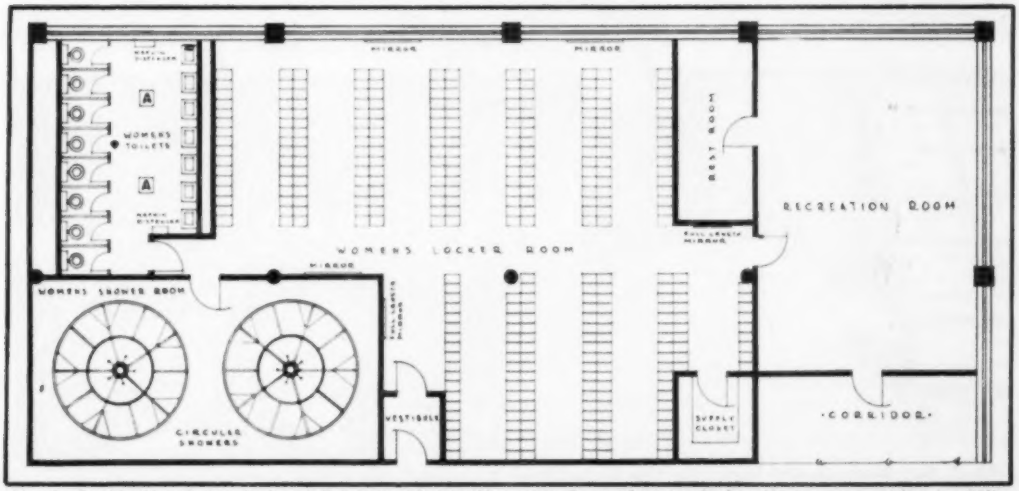


Fig. 5. Combination shower, locker, toilet, rest and recreation room for a plant employing 300 women working in shifts

terials should never be stored openly in washrooms.

Floors and walls should be of a hard material, impervious to water, smooth and easy to clean. Floors and walls should be coved at their juncture. Floor drains are in every room for hosing down and precaution against accidental overflow from plumbing stoppages. Good illumination over each facility should supply minimums of 15 footcandles in toilet booths and at urinals, 25 footcandles at washfountains or lavatories and showers. Lighting should be placed directly over facilities and not over center aisles to accomplish these results.

Good color harmonies on walls, floors, and toilet compartments should be used to lessen employee fatigue and provide a change from the work area. Drab colors are depressing.

Bright, well-appointed washrooms may have their pleasing effects nullified by fetid air. Mechanical exhaust systems should be provided even though natural ventilation may be available via open windows. Climatic conditions and seasonal extremes are too fluctuating to rely on windows alone. A minimum of 35 cfm should be exhausted for each toilet or urinal unless the exhaust is within 2 ft of the facility, in which case 25 cu ft is satisfactory.

The rooms illustrated in Figs. 3 and 4 are of such fundamental design and elasticity that their size may be compressed or expanded to suit the population to be served.

Figure 5 illustrates a combination locker, shower, toilet, rest and recreation room for use of approximately 300 women working in shifts. A rest room with cots is included as well as recreation room which may be used as a lounge-smoking room, if so desired. Cots for females should be supplied on the following ratio: 6-40 females, 1 cot; 41-100 females, 2 cots; 101-250 females, 3 cots. For each additional 250 females, 1 cot. Note there are no provisions for drinking facilities. They should never be included in toilet or washrooms. Equipment design will be discussed in the ensuing article.

Table I. Fixture ratios based upon industrial plant populations, male and female

Water Closets	Urinals	Lavatories		Showers
Persons Male or Female		Persons	Lavatories	
1-9 .....1 10-24 .....2 25-49 .....3 50-100 .....5 Over 100, add 1 closet for each 30 additional persons.	Wherever urinals are provided for men, one water closet less than the number specified herein may be provided for each urinal, except that the number of water closets shall not be reduced to less than 2/3 of the number specified herein.	1-100	1 for each 10 persons. Over 100 add 1 lavatory for each 15 additional persons.	1 for each 15 persons who may be exposed to excessive heat, or to skin contamination with poisonous, infectious, or irritating material.

Foam on the Floor Protects from Solvents Fires

A NEW METHOD of fire protection for plants using such solvents as benzene and gasoline has been installed at the Brunswick, Ga., plant of Hercules Powder Co. The new system is a fixed-foam installation capable of covering the floors of protected areas with a foam blanket at least 6 in. deep in three minutes.

The Hercules plant processes pine stump wood and extracts rosin, resins, pine oil, turpentine, etc. Benzene is used in the extractor house and the refinery, after which it is returned to storage for re-use. Further processing is done in the Pexite plant where gasoline and furfural are used.

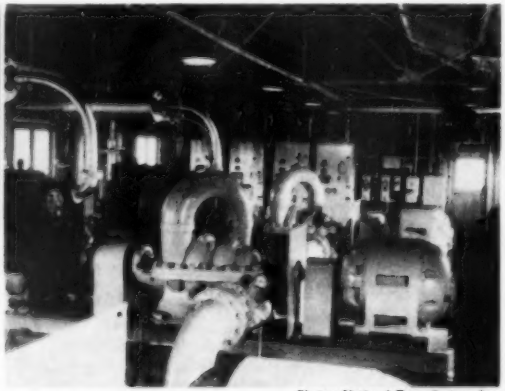
Foam liquid comprises about 6 per cent of the water-foam solution forming the smothering foam blanket. Sixty-six hundred gallons per minute of water foam solution can be delivered to the three protected buildings, or about 66,000 gal of foam per minute.

To inject the foam solution into the suction of the three 2200-gpm water pumps installed by Hercules, two 400-gpm, 65 psi centrifugal pumps are ready for instant action. Only one of these latter pumps is necessary to supply the maximum quantity of foam solution required, although both are arranged to discharge the liquid into the suction line of the three 2200 gpm pumps.

One man, by operating a few switches, can arrange for the discharge of foam from all outlets of the fixed foam systems within about one minute from the start of a fire. Installation was made on the basis that if fires should occur, those of greatest severity would be at the floor or ground levels from a spill of benzene, gasoline, or other solvent, which react similarly to fire. Therefore, foam applicators are placed about 9 in. to 12 in. from the floor.

Concrete curbs 6 in. high have been installed around the buildings' perimeters on every floor to help build up the required depth of foam. Similar curbs have been installed around all floor openings.

Fig. 1. In 4 minutes and 30 seconds the floor is completely covered with foam to a full 6 in. depth at the outer edge



Photos: National Foam System, Inc.

Fig. 2. Only one of these pumps is necessary to supply the maximum quantity of foam although both can be operated

Solving Piping, Pumping Problems

This rendering plant had the problem of handling tallow and blood through long runs of piping . . . Steam induced into the piping solved the tallow problems . . . Air is used to handle the blood . . . Cookers are filled with floor level operated three-way valve . . . Steam jets, installed at intervals along tallow line, help in day's clean-up job

By K. E. TURECZEK, Superintendent of Piping, MacMen, Inc.

HANDLING UP to 10,000 lb of readily solidifying tallow, and blood, daily by conveying it through a network of hundreds of feet of tightly constructed piping without shut down, is the outstanding operational record being established by the State Packing Company of Los Angeles in its new, modern rendering plant.

Steam is the propellant used to force the tallow from one part of the plant to another, while air under pressure is used to blow the blood. This difference is dictated by the divergent properties of the two substances. If allowed to cool, tallow will quickly solidify enough to clog the pipe structure and cause immediate stoppages. Steam induced into the piping at 120 psi furnishes the heat and motive power necessary to keep the mass liquefied and moving smoothly through all apertures and bends.

Steam is injected into the lower portion of a huge blow tank at 120 psi forcing the substance to be processed through a 6 in. extra heavy welded line. This line is constructed of long radius bends and is connected to a three-way valve which in turn is connected to huge cookers. This three-way valve affords the operator full control over the material. It is equipped with a chain-operated wheel which enables the operator from floor level to fill both cookers simultaneously or individually, as desired.

These cookers are heated with steam which enters an outer jacket of the cooker at a pressure of 80 psi. This pressure is obtained by reducing the initial 120 psi boiler pressure by means of pressure reducing valves. Care is taken to properly drip the steam line ahead of this valve, so as to get live steam up to the block valve ahead of the reducing valve at all times. This not only assures the operator of steam in the cookers almost the instant the valve is opened, but also prevents condensate under pressure from passing over and through the seats of the valve, and thus eliminates any possibility of unnecessary wear.

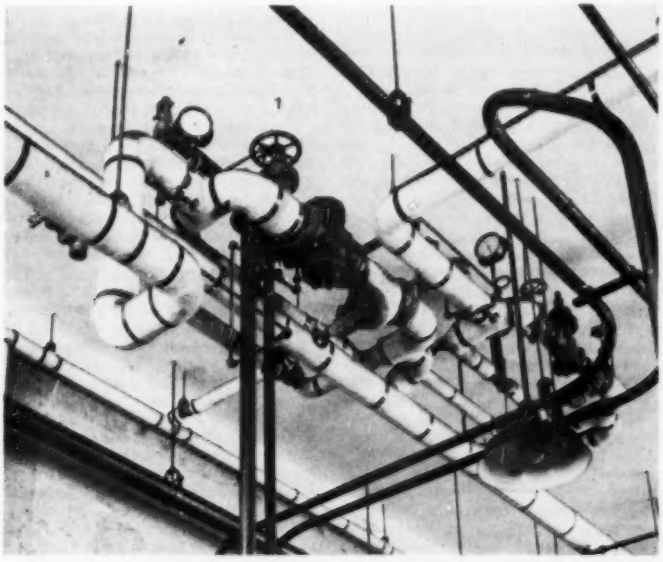


Fig. 1. To enable the operator to know just what operating conditions are and how system is working, pressure gauges are installed on reducing valve assembly

A strainer is installed between the reducing valve and block valve to prevent foreign matter passing into or through the reducing valve. The strainer is equipped with a blowoff valve so it can be cleaned without complete removal. A by-pass is installed around each reducing valve assembly and equipped with a globe valve so that steam may flow through to the cookers without any interruption when it becomes necessary to remove the reducing valve or strainer for service. To enable the operator to know just how the system is functioning, pressure gauges are installed at the reducing valve assembly. One is on the high pressure side, ahead of the reducing valve and the other on the down stream side or after the reducing valve. A pressure relief valve is also installed on the down stream side of the reducing valve as an added measure of safety, should someone open the by-pass valve. Pressure relief valves are also installed on the cookers, as well as a thermometer to record cooker temperature.

The outer jacket of the cookers is provided with steam traps and the condensate is returned to the condensate header. These traps are of the bucket type and are also equipped with strainer by-pass arrangement and check valves.

Vapors from the cookers are released through a regulating valve set at a predetermined pressure. They are discharged through 4 in. all-welded steel lines to jet condensers located on the outside of building. A 2 in. water line is connected to jet condensers and a stream of cold water condenses the vapors which drop through a 4 in. line to a catch basin. At this point, any trace of tallow is then skimmed from the surface of the water and returned to the tallow tank. Check valves are installed in the 4 in. drop to prevent any siphoning action from the catch basin to the cookers.

After being properly cooked, the cracklings are emptied from the cooker into a huge strainer. Here they are allowed to drain into a double bottom vessel which is heated by steam coils to prevent the tallow from solidifying. From this vessel the tallow is pumped to a series of settling tanks where the fine particles of cracklings are separated. The tallow line is also a steel all-

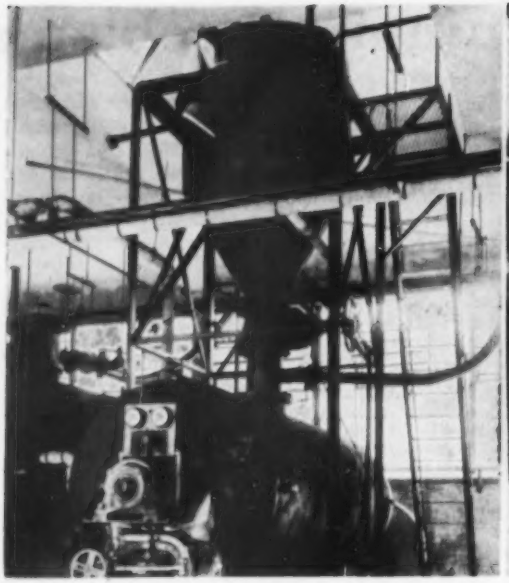


Fig. 2. After the required amount of blood for one cooking is accumulated in the coagulating tank the 14 in. gate valve is opened and the blood enters the cooker. This valve, 12 ft from the floor, is operated by means of a spur gear

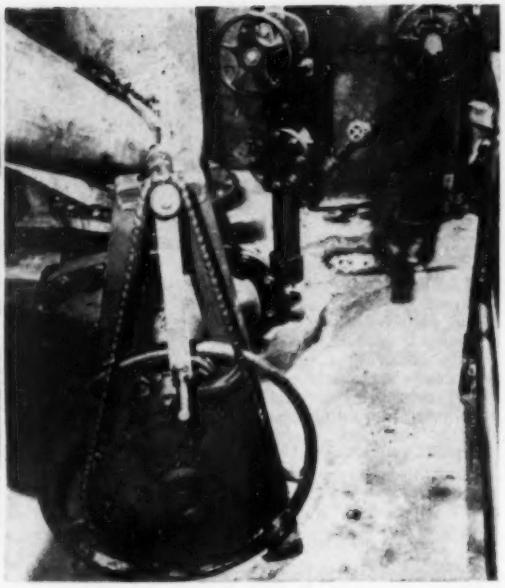


Fig. 3. Close up of the 16 in. chain-driven gate valve which is operated from the floor. All valves controlling steam and tallow flow are equipped with extension handles. Much thought was given to ease of operation and maintenance

welded line with long sweeping bends to assure a free continuous flow without interruption.

All valves controlling the steam and tallow are equipped with extension handles. Much thought was given in the installation of this equipment as to the convenience of the operator as well as the service man.

After the cracklings have been transferred by conveyor to a massive press, the remaining tallow is also pumped to the settling tanks. Here too the same type of welded construction and long radius bends are used.

At the pumps, and at intervals in the tallow lines, steam jets from the steam main have been installed, and after each day's operation, all the tallow lines and pump are thoroughly cleaned and the system is left free of any tallow which might otherwise congeal and possibly cause stoppage. Provisions were made for expansion and contraction in the tallow lines when subjected to steam cleaning.

These settling tanks are also of the double bottom type equipped with steam coils to maintain the correct degree and proper consistency of the tallow. These coils are of extra heavy pipe, all welded and properly dripped. The same type steam traps are installed throughout the plant to standardize on equipment which means fewer repair parts in the stock room.

From these settling tanks, the tallow is pumped to two storage tanks having a capacity of approximately 130,000 lbs. They are located in the rear of the plant adjacent to the delivery area. A spiral steam coil is installed in each tank and steam enters at a pressure of 80 psi. The steam main is dripped by means of a tray assembly before entering the coil. With this arrangement, live steam is available at the coil when it is desired. A steam tray is also installed as the coil leaves the tank and the condensate is returned to the condensate return lines.

All piping in the plant is securely and neatly supported with steel hangers. Where more than two lines parallel each other, trapeze hangers are used. All lines are properly graded and steam lines dripped at end of each main or branch.

Blood from the killing floor flows by gravity through a 6 in. line to the basement where it is stored in a blow tank provided with air jets at the bottom. These jets allow a blast of air under pressure to enter the tank and set the blood in motion. When a pressure of approximately 55 psi is indicated, the quick opening gate valve is opened and the blood is then forced through about 120 ft. of 3 in. welded pipe to a coagulating tank. This 3 in. line is constructed of numerous flanged spool pieces to allow easy access to the segments of the line for cleaning and removal. An air compressor, connected to an auxiliary tank for additional volume storage produces air for transmitting the blood.

After the required amount of blood is accumulated in the coagulating tank for one cooking, the 14 in. gate valve is opened and the blood enters the cooker. This valve, while approximately 12 ft. above the floor, is easily operated by means of a chain driven spur gear from the operating floor.

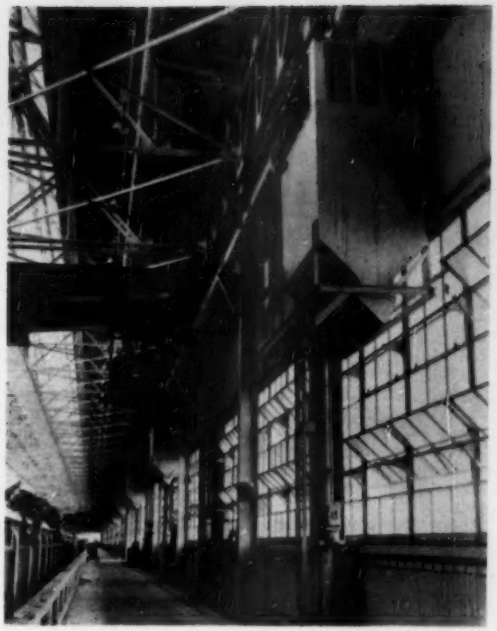
This cooker is very similar to the other cookers inasmuch as it has the same type steam chamber and tray arrangements. Pressures and temperatures in the cooker are indicated on the gauge board in full view.

Hot water is used to wash up the plant and it is generated by a steam coil in a hot water storage tank. The temperature of the water is controlled by means of a thermostatic temperature controller. This control is connected in the steam line, using gate valves and strainers, also a globe valve in the by-pass. The water is then heated to 180 F and forced by means of a 2 in. centrifugal pump, especially designed to pump hot water to a temperature regulating valve. This valve has a hot water and cold water inlet and by setting the pointer on the valve handle to the desired temperature, the water is then discharged from the valve to the various locations throughout the plant.

Chief Engineer Jess Williamson and his son are in charge of the plant. It was designed by Mario J. Ciampi, San Francisco. Piping and equipment were installed by Mac-Men, Inc., Los Angeles, specialists in equipment installation.

A 1240-Ft Long Building Makes Special Heating Demands

High ceilings, no dividing walls and a six-acre floor area posed tough problems at Wolverine Tube Div. plant . . . Upside-down unit heaters solved main plant problem; conventional installation used at other points . . . Propane gas plant provides all of this huge plant with heating fuel



Photographs: Dravo Corporation

Along each sidewall of the mill were installed 13 unit heaters, spaced 80 ft apart to provide a blanket of warm air and to minimize the heat loss through the 40-ft high roof

IT'S A BIG JOB—heating a building as long as several football fields and doing it economically. The main objective is to try to keep the working zone at a comfortable temperature for employees without wasting heat where it is not needed.

At the new copper tube mill of the Wolverine Tube Division of Calumet and Hecla Consolidated Copper Co., Inc., on the south bank of the Tennessee River near Decatur, Ala., such a heating problem confronted the engineers.

The main part of the structure is 1204 ft long by 225 ft wide with a roof nearly 40 ft high. It has no dividing walls. The floor area, totalling more than six acres, is completely open from one end to the other. Of steel frame construction with corrugated siding and continuous side wall windows 9½ ft high, the building has six roof monitors, each 1160 ft long.

Establishing and maintaining comfortable temperatures in the sprawling structure could best be accomplished by warm air, engineers decided. Through the use of heaters with sufficient air-handling capacity, the necessity of installing heating equipment along the center line of the structure could be avoided. Production operations, therefore, would not be impeded by piping and wiring for heating equipment.

Along each sidewall, running north and south the length of the plant, 13 heaters, each with a capacity of 1,000,000 Btu per hr, were suspended from building columns. The heaters are spaced about 80 ft apart. With each discharging warm air at a velocity of approximately 2000 fpm, a "layer" of warmth is maintained in the working zone—from the floor to about 12 ft above the floor.

Heats Return Air

Each of these 26 heaters is installed in an inverted position with four air discharge nozzles about 10 ft above the floor. The heaters, operating 100 per cent on recirculated air, pull return air through louvered openings at their tops. Air, rising from the floor toward the roof, is caught in the return air suction path of the heaters. In this way, heat losses through the roof are reduced.

Since each heater is equipped with a stainless steel combustion chamber, which eliminates the need for refractory lining, installing them in an inverted position did not pose any special problems. The only change made over the standard model was the inversion of the control panels. The heaters are painted gray, the same color as the interior walls, to blend with the mill's modern color scheme. Beside each heater a small working platform of steel grating was installed with access to the platform by means of a steel ladder.

In addition to their use for heating during the winter months, the heaters are operated, with burners off, for ventilation during the summer.

Besides the 26 inverted heaters, the mill structure is served by six other heaters, each with an output capacity of 2,000,000 Btu per hr. These larger units are arranged to operate with a mixture of fresh air taken from the outside and air recirculated from the plant interior. One heats the 160 ft by 75 ft box factory adjoining the northeast corner of the building. Two others are positioned upright along the north wall of the main structure and the other three are along the south wall. One of the latter is located in the casting shop at the southeast corner, an area of 160 ft by 75 ft which adjoins but is not partitioned from the main building.

These six heaters replace with fresh, tempered air the air which is exhausted from the building in various ways. Approximately 122,200 cu ft of air per minute are removed by ventilators over the electric arc casting furnaces, a rotary billet heater and four annealing furnaces. The six make-up air heaters can handle a total of approximately 132,000 cu ft of air per minute.

Unlike the 26 inverted heaters which are controlled off-and-on by thermostats, the floor-mounted heaters are equipped with modulating controls that can reduce fuel input to 25 per cent of rated capacity. This arrangement permits constant ventilation while maintaining desired

temperature at all times. The fresh air intake opening in the wall behind each heater and the return air opening in the front heater base have louvered damper connections that are motor operated. Normally, the air supply for these heaters is 100 per cent from the outside. This air is brought in, flows over the stainless steel combustion chamber and is discharged into the working area. However, if the discharge air temperature drops below prescribed room temperature, the dampers operate automatically to blend recirculated warm air with the fresh air.

Design temperature for the mill structure was based on 60 F indoors and plus 10 F outdoors. With these temperatures, and 1½ air changes per hour, heat losses were calculated at 27,456,000 Btu per hr.

Three other structures at the plant are heated by the same type of equipment. The Electrolytic Building, with an indoor temperature requirement of 60 F and 2¾ air changes per hour, is 150 ft by 160 ft with an average roof height of 32 ft. This building is equipped with two 2,000,000-Btu-per-hr heaters arranged for tempering make-up air on the same modulating control principle as the large heaters in the main building.

The shops in the Engineering Building occupy space measuring 360 ft long by 75 ft wide by 27 ft high. Here, two heaters, operating on recirculated air with a combined capacity of 2,500,000 Btu per hr, are used. Offices at one end of this structure are equipped with a combination air conditioning-heating system, as are other smaller buildings on the plant property.

The power plant, containing air compressors, electric boilers for process steam, and other equipment, has one 1,000,000-Btu-per-hr heater operating on recirculated air to provide comfort heating and to prevent freeze-up in case of boiler failure.

Propane gas is employed for firing all the plant's space heating equipment, except a few small steam convectors used to heat employee locker rooms. This propane gas is conveyed from the propane gas plant, located on the south side of the plant site, through approximately 900 ft of 12 in. underground gas main to a point where it enters the boiler house and an underground utility tunnel. It then continues the entire length of the utility tunnel. From this 12 in. main, a 6 in. header is taken off to a 6 in. loop around the mill building.

This 6 in. loop is suspended in the roof truss space of the building and, from the loop, 2 in. drops are run to each unit heater. All of the 12 in. underground and exposed supply line, as well as the 6 in. loop and the 2 in. drops, is of welded steel pipe construction.

The two unit heaters in the engineering building are supplied from a 3 in. line taken off the 12 in. supply line in the boiler house basement. This 3 in. supply line is carried in the utility tunnel between the boiler house and the engineering building and finally in the overhead truss space in the engineering building with 2 in. drops to each heater.

Installed in the propane plant are three 30,000 gal all-welded steel storage tanks for liquid propane. Liquid propane is received in railroad tank cars of approximately 10,000 gal capacity and is delivered to the storage tanks by means of compressed air. From the storage tanks the liquid propane is piped to steam-heated heat exchangers in which the liquid is converted to a gas. From the heat exchangers the propane gas is piped through a surge tank to diluters where propane and air are mixed to produce a gas of 1550 Btu per cu ft. From the diluters the air-gas mixture passes through a booster which discharges it into the mains at approximately 5.25 psi.

In conjunction with the propane plant, a 30,000 gal work tank is utilized as a supply tank for the air-gas mixture and as a cooler for the gas boosters to give the required turn-down when the full capacity of the gas booster is not being utilized.

Maintenance and Operation

Cartridge Heaters and the Hoe Handles

ASH TIMBER, used by Union Fork & Hoe Co., Columbus, Ohio, is scarce, expensive and hard to find. The company needed all the handles they could make to supply the demand for new garden tools.

The ash timber is cut into squares, turned into round dowels approximately 5 to 6 feet in length, and all defects in the wood cut out. This careful selection to obtain good handles results in the accumulation of a large quantity of short dowels, which has always been a problem.

Union Fork engineers, in investigating the repair handle, decided on a spliced or bonded handle using their supply of short dowels. They carefully selected short dowels that would match in grain and appearance. Splicing cuts were made on the dowels to give maximum strength. The female dowel has a V cut out and the male dowel a chiseled V on the end. These cuts were covered with a bonding material which, after being placed together, required a curing period of five days at a temperature between 80 to 90 degrees, to give maximum bond and strength of the spliced handle.

To accomplish this engineers of the Ohio company designed a hydraulic press with a clamp to house the bonded joint. After determining the size, weight and type of metal used in the clamps, four 1000 watt, 230 volt, cartridge heaters were installed as the heating elements. The heaters were placed as close as possible to the splice, two were installed in the lower half, two in the upper half of the clamp. The sensitive bulb of the thermostat was placed in the lower half or stationary block of the clamp to control the temperature.

The electric controls were so arranged that when the bonded handle was in the proper place and the press actuated, a timing device was started and, at the end of 60 seconds, the press was released. The bonding material was properly set, thoroughly dried, and penetrated into the wood about ⅛ in. The wood was not scorched and the bonded handles were ready for the curing room with no additional holding clamps being required.

At the height of production, the Union Fork and Hoe Company make 2400 handles per day. Bonded handles were tested by a drop test of 125 lb, 14 inches from the splice; and failures have never occurred at the bond.

(Continued on page 90)

Photo: General Electric Co.

Operator holding handle in position while required amount of heat is applied to bond the spliced ash hoe handles at plant of Union Fork & Hoe Co., Columbus

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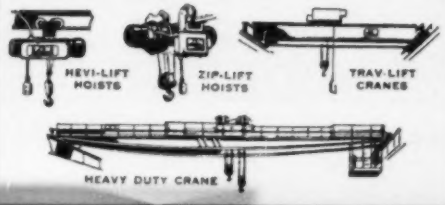

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Data File and Library

STANDARD CATALOGS, bulletins and handbooks are listed here to aid plant engineers in maintaining a permanent data file. Unlike the recently-published literature listed in the Helpful Bulletins on Current Plant Problems section, these publications will be listed monthly, as long as available, except for additions and deletions determined by space requirements. Use the Helpful Bulletins postcard in requesting copies of these publications.

VALVES

201 Valves and Specialties for Corrosive Services—Gate and needle valves, screw machine products, hose nipples, tubes, flanges, hot rolled bars and welding electrodes described in Bulletin W-350-35B are made of Worthite, a stainless alloy produced for company's in equipment for handling various corrosive solutions. Gives sizes, specifications for equipment listed, includes photos. Worthington Pump and Machinery Corp.

202 Blow-Off Valves—Bulletin B-424 is a 24-pp catalog covering blow-off valves for low and medium pressure boilers. Describes and illustrates construction details for seatless valves and double-tightening valves. Includes specifications, dimensions, weights and prices on valves and parts. Pictures many installations. Yarnall-Waring Co.

203 Gate Valves—Specifications, sizes, and dimensions for bronze gate valves of heavy duty construction for use on steam, water, oil, or gas lines are provided in pocket-size Circular 102. Brief text discusses maintenance, installation and operation. Illustrations show screwed and bolted bonnet types, design features. The Kennedy Valve Mfg. Co.

204 Reducing Valve Engineering Data—Bulletin 962 presents data on pressure reducing valve, explaining how its streamlined contour contributes to efficiency of performance. Discusses and illustrates valve's straight-line flow, wide opening, tight closing and other design features. Includes sizes, dimensional data and steam and air capacity charts. A. W. Cash Co.

205 Air Control Valves—Folder A illustrates 20 air-controlled valves, showing two-way, three-way and four-way air flow and indicating open, closed and exhaust positions. Text briefly covers special design features, sizes, basic types, capacities and available metals. Valvair Corp.

MATERIALS HANDLING

206 Overhead Handling Equipment—In Bulletin C-1, 56 pp, are more than 100 photos of overhead handling equipment in use in all types of industries. Sketches of trolleys, cranes, switches, track and auxiliary equipment show construction, safety features, electrical advantages. Book also discusses engineering services offered, includes data sheet for requesting information on special problems. The American Monorail Co.

207 Industrial Jacks—Catalog 50 is a 28-pp ordering book covering single acting rachet lowering jacks, track jacks, screw jacks, hydraulic jacks, push and pull jacks, reel jacks and related equipment and accessories. Gives sizes, capacities, weights; tells applications. Templeton, Kenly & Co.

208 Materials Handling Equipment—Catalog 23, 90 pp describes most types of company's power trucks, power jacks, stackers and cranes, hand trucks, platforms and storage racks, and related equipment. Fully illustrated with photos and drawings it includes specifications, capacities, sizes and application data. Lewis-Shepard Products Inc.

209 Handling and Processing Equipment—Catalog 791, 32 pp, presents line of feeders, bin valves and level indicators, reduction machinery, vibrating screens and processing equipment, magnetic separators, elevating and conveying machinery, barrel packers, electrical controls for vibrating units, also chains and transmission machinery. Illustrated with photos and sketches of units and installations. Gives typical applications and advantages of equipment, explains operation. Includes specifications, sizes. The Jeffrey Mfg. Co.

210 Conveying Systems Manual—Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin PE-25. Text covers complete system and its operation, also stationary pump and related equipment and is illustrated by photos and dimensional drawings, with sizes listed. Several installations of conveying equipment are described and pictured. Also presents an air compressor for use with conveying systems, and remote-control unloader. Fuller Co.

211 Electric Hoists—Catalog H-46 is a 44-pp manual covering monorail and stationary hoists and car pullers and providing helpful information on fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, types of controls and factors to be considered before ordering. Contains full specifications and dimensional data, illustrations of models, many photos of installations. American Engineering Co.

212 Freight Elevator Buyer's Guide—How to integrate selection of freight elevators with materials handling needs is among questions answered in Booklet B-4402, 44 pp. Ten illustrated sections explain basic considerations involved, also component parts of freight elevators. Covers lifting capacity and size; control systems; methods of door operation; layouts for standard freight elevators; types suited to plant needs; budget price information, and typical and special installations. Elevator Div., Westinghouse Electric Corp.

213 Conveyor and Elevator Belting—Full engineering data covering company's line of belting for conveying jobs and industrial elevator installations are provided in this 24-pp illustrated handbook. Also describes and gives application information and specifications for these beltings. Technical data is clearly presented so as to simplify selection and ordering. Republic Rubber Div., Lee Rubber & Tire Corp.

214 Overhead Handling Equipment—This is a booklet of engineering and application data on company's tramrail equipment. In addition to discussing what this equipment can do toward increasing a plant's handling methods, it illustrates and describes in detail the system's rail and arch design, switches, cranes and transfer bridges, hand operated carriers, hoists, cranes, buckets and grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

215 Conveying Equipment—Illustrated Bulletin 147R presents roller conveyors designed for efficient handling of cases crates, boxes and containers. Photos show flexibility and other features of the equipment, also special models and typical installations. Speedways Conveyors, Inc.

COOLING, AIR CONDITIONING HUMIDIFYING

216 Conditioning Units—The advantages of self-contained conditioning units and their applications in cooling, dehumidifying and cleaning are given in illustrated Catalog 1307, 40 pp. Explains installation and operation. Includes complete engineer-

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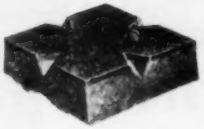

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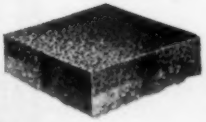

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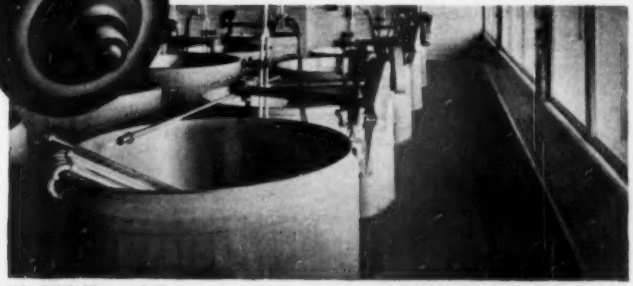

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ing data on direct expansion cooling, cold water cooling, hot water heating, steam heating. Also includes speed and horsepower tables, dimensional data on both horizontal and vertical types, psychometric chart and typical problems involving choice of unit size, number of rows of coils, determining speed and motor horsepower. Clarage Fan Co.

217 Humidifiers—Illustrated Bulletin 1772 covers line of steam humidifiers, including two new air-controlled models. Includes discussion of dry air problems, tables on desirable relative humidities and regain of hygroscopic materials, complete data on operation and installation of both electric and air-controlled types. Also tells how to select humidifiers, giving capacities and prices. Lists and illustrates air-operated and solenoid-operated valves for use in humidifier control. Armstrong Machine Works.

218 Cooling Towers—Section 42 covers induced draft cooling towers for small water-cooled air conditioning and refrigeration condensing units. Illustrates towers and pumps, and discusses applications, operation and installation of the towers, giving specifications. Includes typical installation diagram, capacity and performance tables, also tower and pump selection table. Binks Mfg. Co.

ELECTRICAL

219 Motor Data—Bulletin MU-185 is a collection of more than 60 pp of engineering and descriptive data on company's line of motors. Covers many types, including splash-proof and explosion proof motors, gear motors and motors intended for use in chemical plants, for oil well pumping, punch press motors, elevator, crane and hoist motors. Illustrated throughout; includes price lists. Wagner Electric Corp.

220 Voltage Control—Bulletin 547, covering variable transformers and voltage regulators, illustrates and describes available models, stressing their special features and including specifications, dimensional data, ratings and connection arrangements. Also presents electronic electro-mechanical regulators. Includes price list. The Superior Electric Co.

221 Selenium Rectifiers—Booklet DB-19-025 on standard and high-voltage selenium rectifiers for power supplies and electronic circuits gives efficiency curves for both types, together with discussions on efficiency and service life, back leakage and reverse resistance and forward resistance. Life characteristics of both cell types for various overload conditions or high ambient temperatures are plotted graphically. Includes tabular presentation of schematic diagrams, formulas for calculating rectifier performance, and cell ratings. Westinghouse Electric Corp.

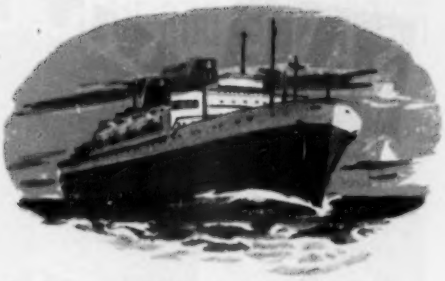
222 Capacitor Motor—Bulletin GEA 5401 presents integral horsepower, single-phase capacitor motor, illustrating and discussing its compact size, transfer mechanism, bearings, and terminal board. Emphasizes long service and protection against damage, breakdown and operating wear afforded. Also stresses motor's easy installation and quiet operation and explains company's motor exchange plan. Gives specifications, characteristics of motor, and elaborates on construction features. Apparatus Dept., General Electric Co.

223 Power Distribution Feeders—Catalog TEB-1, 40 pp, is devoted to heavy-duty units used as main feeders in company's power distribution system, giving construction details, engineering data, application tips. Includes comparative analysis between this and other methods of power distribution on basis of cost and performance. Also contains full listing of parts, telling how to specify, order and install equipment. The Trumbull Electric Mfg. Co.

224 Volt Ammeter—A seven-range, clip-on volt ammeter is discussed as to design and use in illustrated List In. 17V. Explains special features in detail and includes dimensional data, price. Ferranti Electric, Inc.

225 Planned Lighting Guide—This selection guide features a chart which enables reader to see at a glance the appli-

1. Before pulp becomes paper, long, trim lines of copper tube have conveyed pulp, stocks, "white water" and just plain water.



2. Engine rooms of great steamships are a maze of copper tubes carrying steam, hot water, cold water, sea water, fuel oil, and lubricating oil.

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cation of each of company's 12 major lighting systems, covering practically every seeing task with illumination requirements from 10 to 150 ft-c. Another chart covers special lighting units for use in locations with combustible, dusty or damp atmospheres. Tells what to look for when appraising lighting equipment and a check list of benefits derived through proper application of planned lighting to industrial operations. Benjamin Electric Mfg. Co.

226 Precision Switches—Catalog 81, 20 pp, covers industrial switches for a-c circuits. Describes and illustrates general purpose basic switches, reset basic switches, auxiliary actuators, enclosed switches, explosion-proof and splash-proof types, limit switches and extra small switches. Includes full ordering information, technical data and definitions, price list and discount schedule. Micro Switch.

227 Answer Card—Rules of thumb for answering questions on capacities and applying power-factor-improvement are printed on a double card small enough to fit in plant engineer's wallet. With this card he can quickly compute the answers to the questions: How many kilovars? What power factor? How much voltage rise? Simplified diagrams illustrate formula for quick computation. Apparatus Dept., General Electric Co.

228 Power Transformers—Bulletin TU-181, providing more than 108 pp of descriptive and technical data, contains sections on power transformers and unit substations of both dry and liquid-filled types, on transformer performance and on company's transformer manufacturing facilities. Text is fully illustrated. Wagner Electric Corp.

229 Switch Tips—This is a regularly issued publication filled with good ideas and helpful suggestions on use of company's snap-action switches. Will be mailed to plant engineers who request it. Micro Switch.

MECHANICAL POWER TRANSMISSION

230 Flexible Couplings—Catalog FC-50 describes and illustrates roller chain flexible couplings for direct power drive applications stressing design features. Includes selection data, ratings, dimensions. Also includes descriptive and ordering information on coupling covers. Whitney Chain & Mfg. Co.

231 Transmission Belting Manual—Answers to most of the questions on transmission belting are provided in this 28-pp book. Illustrates company's beltings, gives specifications, tells how to select correct type for the job; also how to order belting, install it and maintain it in good operating condition. Filled with technical data, including comparisons, usefull formulas, tables of belt speeds, overload and correction factors. Republic Rubber Div., Lee Rubber & Tire Corp.

232 Chain Drives—Engineering Catalog SCE-50, 68 pp, provides data on company's silent chain drives, giving their advantages, recommended applications. Also gives information on chain length calculation, installation and maintenance, dimensions, ratings, prices. Actual-size photos illustrate chain types, pitch. Includes full ordering data on sprockets.

Catalog CR-48, 16 pp, contains similar information on company's roller chain drives. Both books are available; ask for either or both. Whitney Chain & Mfg. Co.

PUMPS, COMPRESSORS

233 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6256A is a revised handbook on the care of all makes of centrifugal pumps, giving the how and why of pump construction and their effect on pump maintenance. This informative booklet tells how to figure head and it carries tables to help determine friction loss. Causes and cures for various sources of troubles are offered along with a new maintenance timetable. Also included are little known facts about cavitation and how to protect pumps against it, water's role as a pump lubricant, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

234 Turbines, Pumps, Compressors—Bulletin 1181A provides an over-all presentation of company's line of steam turbines, centrifugal pumps, multi-stage pumps, and

pumps specially designed to handle viscous fluids and oils, as well as blowers and compressors, and worm gear speed reducers. Includes photos of models and installations, cutaway illustrations and sectional diagrams to show design features. De Laval Steam Turbine Co.

235 Pumping Units—Bulletin 4303 is devoted to centrifugal pumping units with fan-ventilated drip-proof motors. Includes photos of pump assembly and parts, cutaway illustration. Provides full specifications and dimensional data, also selection chart for various capacities and heads and key to selection chart for 60 cycle motors. The Deming Co.

PIPING, TRAPS

236 General Catalog on Piping and Valves—Catalog 49, covering 564 pp, provides full engineering and ordering data on company's line of valves, fittings, pipe and fabricated piping, as well as gages, pressure regulators, steam traps, separators and expansion joints, and also tools and accessories for piping installations. Book is a complete reference text for the selection and installation of piping. It's generously illustrated with photos, sketches and charts, indexed for easy use, and includes full specifications, sizes and prices. Available to qualified plant engineers. Crane Co.

237 Steam Trap Manual—"Solving Steam Trap Problems," 36 pp, covers correct trapping practice for unit heaters, jacketed kettles, autoclaves, submerged surfaces, hospital, kitchen and laundry equipment, steam mains, header drips etc. Tells how to select size and determine lift of trap. Explains theory, operation, maintenance; gives details of simplified piping for steam traps. Also discusses float traps, air release valves and pipe line strainers. Specifications, capacities and some prices are given. Book is illustrated throughout and includes condensate and steam tables. The V. D. Anderson Co.

238 Steam Traps—Impulse traps for power plant, steam distribution systems, industrial steam processes are described in 16-pp Bulletin T-1739. Illustrated with photos, cutaway and sectional drawings, it tells how to figure sizes needed, gives application data, installation and operating suggestions, capacities, weights, dimensions and prices. Yarnall-Waring Co.

239 How to Select Steam Traps—Contending that there is no universal trap, Selection Chart 1600 describes and illustrates thermostatic, inverted bucket, float thermostatic, and liquid expansion types giving advantages and recommendations for use. Includes table showing first and second choice of trap types for 34 applications. Sarco Co., Inc.

240 Pipe Hangers—Ninety-pp Catalog 10-D is a buyer's guide for adjustable pipe hangers and supports. Covers hangers for attachment to pipe and to structure, hanger assemblies, spring hangers, hanger rods, pipe supports and related equipment. Each type is described and illustrated by photos and dimensional diagram and listed with sizes, prices. Catalog also includes standard specifications, photos of installations and terms of sale. Indexed, ring punched. Grinnell Co., Inc.

CONSTRUCTION

241 Roofing Manual—Full engineering data on manufacturer's roofings and their use is presented in Specifications 50, 36 pp. Covers not only coal tar pitch roofings, but also waterproofings, roof insulations, flashings, protective coatings. Includes illustrated instructions for the roofing of most types of roof construction, including methods of handling special conditions, amount of material required. Tar Products Div., Koppers Co., Inc.

242 Technical Data on Plexiglas—This is a file folder of technical and application information on Plexiglas sheets, rods and molding powders, covering their workability, physical properties, available thicknesses. Includes data sheets on the uses and advantages of Plexiglas in large area lighting, typical designs of coffers, photos of installations and a discussion of room lighting. Rohm & Haas Co.

243 Plexiglas Applications—This booklet illustrates many of the ways Plexiglas is now being used. Also gives physical properties, sizes and descriptive information about this acrylic plastic in sheet and rod

Workers get Clean Air and Clear Vision with ROTO-CLONE Dust Control

THEY don't "let the chips (and dust) fall where they may" in this foundry. Pictured here is a modern down-draft chipping booth which is served by an AAF Type D Roto-Clone.* Chips and dust are drawn off as fast as they are generated. Worker comfort is vastly improved and he has a clear view of the job at all times.

No matter what you grind or how you grind it, a Type D Roto-Clone will give you positive dust control. This compact, self-contained unit combines the functions of both exhauster and separator. All operations—drawing in the dust-laden air, separation of dust, delivery of collected material to storage hopper and expelling the clean air—are performed by one moving part.

You don't have to rearrange and disrupt your grinding operations to take advantage of Roto-Clone dust control. The Type D may be installed as a central type with main dust and branch connections or as an individual unit serving a single dust-producing operation. For complete information, call your local AAF representative or write direct to

Roto-Clone is the trademark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator types

AMERICAN AIR FILTER COMPANY, INC.
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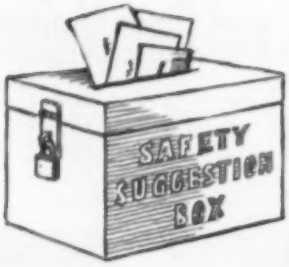
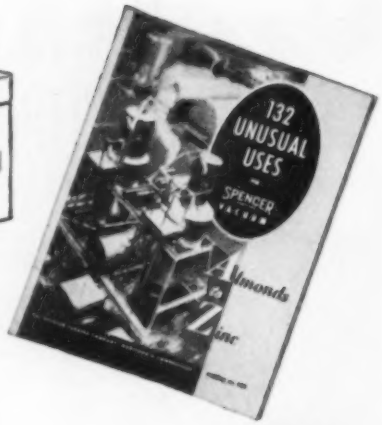
In Canada: Darling Bros., Ltd., Montreal, P. Q.

AAF
ROTO-CLONE
DUST CONTROL EQUIPMENT





132 NEW IDEAS WITH SAFETY AS AN EXTRA DIVIDEND!

Here is a book full of ideas for accomplishing difficult production tasks with great speed, accuracy, and reduced costs, and yet every one of the suggestions might well be dropped into the Safety Suggestion Box.

For instance, Spencer Vacuum handles hot materials such as ashes and cinders, and cleans out the bottoms of 30 foot car wheel pits while still hot.

Conveying of chemicals, foods, silica sand and other materials by the ton, is accomplished without scattering dust.

Fumes from autos in repair shops, from welding operations and in chemical plants, are collected at their source.

Rock drills used in quarries or for concrete are provided with a hood connected to Spencer Vacuum.

And, with the same Spencer Equipment, floors, walls, ceilings, pipes and all machinery can be kept clean.

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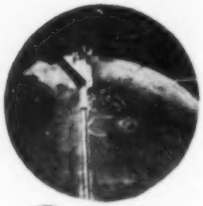

Recovering Welding Flux

Chemicals

Removing Cocoa Shells

356-D

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forms and discusses molding powders and their use. Rohm & Haas Co.

244 Open Steel Flooring—This is a 24-pp illustrated catalog on riveted and welded flooring units for use as stair treads, platforms, walkways, decks, landings, runways, catwalks, boiler room installations, sidewalk gratings. Also covers anchors. Includes a typical layout for an open floor installation, also safe load table. Wm. F. Klemp Co.

245 Steel Grid—Form 405 explains and illustrates heavy duty steel grid for prolonging life of old and new industrial floors and traffic surfaces. Tells economy and other advantages of the grid and provides directions for use over various types of surfaces. Photos illustrate instructions, also show several interior and exterior installations. Wm. F. Klemp Co.

MAINTENANCE

246 Manual of System Planning, Preventive Maintenance—This 50-pp book covers complete story of electrical system planning and maintenance. Covers system functions; code reference chart; voltage drop tables; power factor charts; guides for motor wiring; guides for lighting wiring; electrical system records; supplementary feeder schedule; preparing electrical plans; switchboard and feeder schedule; riser diagram of complete system; motor and control schedule; symbols for wiring plans; preventive maintenance; diagnosing system conditions; general system survey; load survey. Anaconda Wire & Cable Co.

247 Industrial Products for Maintenance and Construction—This catalog is a comprehensive collection of data sheets on company's line of industrial products. It gives product descriptions, specifications and directions for use. Covers heavy duty mastic floorings, asphalt protective coatings, waterproofing and dampproofing materials, resilient floor covering underlayments, industrial adhesives and cementing compounds, pipe wrappings and coatings, Expansion joint sealers and fillers and other products. The Flintkote Co.

248 Building Maintenance Manual—Sixty-four-pp Handbook 7 is packed with useful information on the applications of an extensive line of floor surfacings and other maintenance products, as well as leak stoppers, external wall sealants, road patching, roofing materials. Illustrated throughout with photos and sketches it provides complete product information and step-by-step instructions for use. An extremely valuable reference book, it shows how to analyze problem, select right product, estimate quantity needed and carry out the work. Flexrock Co.

249 Rolling Scaffolds—Sectional tubular steel scaffolds for maintenance, painting jobs are described and illustrated in Bulletin PSS-14. Tells how to assemble basic units and how to increase working area. Includes photos of scaffolds in interior, exterior use. The Patent Scaffolding Co., Inc.

250 Protective Coatings — Filled with photos of equipment and structures protected by Company's corrosion-preventive coatings, Form 948-A, discusses this coating, tells how surfaces should be prepared for it, suggests ways to apply it and recommends thicknesses. Gives specifications for several solutions and explains value of the coatings in industrial atmospheres, around chemical fumes and moisture and in presence of deteriorating soil conditions, high temperatures. Tar Products Div., Koppers Co., Inc.

DUST AND FUME CONTROL

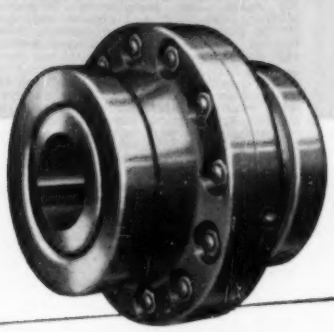
251 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes and illustrates dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. Lists dusts handled by company's equipment and pictures several installations. The W. W. Sly Mfg. Co.

252 Dust Collectors—Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this illustrated bulletin. Includes table of capacities, sizes, also photos of units. The Kirk and Blum Mfg. Co.

253 Electric Blowers—Illustrated Bulletin 573 describes portable electric blowers

GOT A COUPLING PROBLEM

SHEAR PIN?
FLOATING SHAFT?
LOW SPEED?
CUT OUT?
HEAVY DUTY?
REVERSING?
HIGH SPEED?
LIGHT DUTY?



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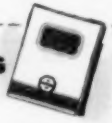

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CAN YOU GET RID OF SMOKE? ...so fast!

This is an unretouched photograph—an electric furnace in this case. But no matter what the source of the smoke (think of it in terms of your own plant), *can you get rid of it like this?*

We assume you are not interested in buying just ventilators—but are interested in getting fresh, clean air. The ventilator used here is shown below, an automatic-damper, fan type which can be flicked on when peak ventilation is needed. Some conditions call for the unique Robertson Monitor type running the length of the roof. Others can be solved with a few small gravity ventilators. With forty-four years' experience all over the world, Robertson has learned to *engineer ventilation*. This goes far beyond merely selling ventilators. Too many men think of putting in ventilation. Actually you have to think of putting in fresh air!

No matter how bad your smoke or heat problem, we have evidence to show we can lick it! When we *engineer* your atmosphere, you are assured of enough fresh air and fast. This is what you want. Let us figure out for you how to get it.

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in ⅛ to 1½ hp sizes for removing dust, dirt, grit and grindings from motors, bearings, shafting and gears. Emphasizes economy of blowers in cutting production and repair costs and saving power. Attachments for use with blowers to make them applicable for industrial vacuum cleaning jobs are also presented. Breuer Electric Mfg. Co.

254 Dust Control—Bulletin 909A, 28 pp, covers necessity and economy of controlling industrial dusts and use of dust control equipment. Describes, illustrates and gives specifications for cloth screen collector. Gives application and engineering data and photos of several installations; also discusses other dust handling equipment. Includes questionnaire outline information needed for analysis of individual plant problems. Pangborn Corp.

255 Welding Fume Collectors—Bulletin 37-D describes and illustrates fume collecting equipment for welding operations. Discusses advantages of collecting fumes at the source, hood protection, good working range, easy installation. Illustrates regular, long-reach and special collectors, giving dimensions and application information. Also describes ventilated welding cabinet. Ruemelin Mfg. Co.

256 Vacuum of Many Jobs—Bulletin 144, 20 pp describes and illustrates 132 unusual industrial uses for company's vacuum system. Applications, listed alphabetically, range from the removal of dust from inside of rolls of adhesive tape to recovery of zinc dust. The Spencer Turbine Co.

257 Positive Displacement Blower—Publication 84 presents an axial flow, high speed blower for handling gas or air under pressure or vacuum from 20 to 15,000 cfm. Photos show complete unit, principal parts. Discusses advantages, lists applications, gives specifications. The Standard Stoker Co., Inc.

TOOLS

258 Tool Catalog—Company's complete line of hand and power tools, tool sets, kits and related equipment is presented in Catalog T, 110 pp. Illustrated with photos of all items listed, it describes tools, includes sizes, applications, shipping weights, other ordering data. Snap-On Tools Corp.

259 Pipe Bending Tools—Pocket-size Bulletin E-201, 16 pp, describes hydraulic and hand operated units for bending iron, steel and non-ferrous pipe, rigid conduit, tubing and bus bars. Illustrates each type of tool and tells its applications, sizes. Also describes a power pump for hydraulic units. Stresses economy and efficiency of portable units for making tailored bends on the job. Greenlee Tool Co.

260 Pipe Tool Ordering Guide—Catalog 50, 36 pp, covers entire line of pipe tools, machines, power drives, threading oil. Products are illustrated by photo and operational advantages fully explained. Includes concise ordering specifications, current price list. Beaver Pipe Tools, Inc.

VIBRATION CONTROL

261 Machine Mountings—This folder describes and illustrates use of a vibration isolating and shock absorbing material recommended for use as machine mounting or as component parts. Explains how material functions and how it is installed. Fabreeka Products Co.

262 Vibration Control—The advantages and limitations of spring mountings, rubber mountings and cork materials in the control of vibration, together with data on their use are given in Bulletin G-102. A selector chart tabulates more than 50 applications and recommends types of isolators for both highest efficiency and satisfactory operation under less critical conditions. Loading ranges are given for all types. Also described are isolators for special applications. Korfund Co., Inc.

MISCELLANEOUS

263 Four Handy Guides for Plant Engineers—Bulletin 20B 6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B 6052K, 12 pp, for quick selection of electric motors; Bulletin 52B 6058E, 16 pp, for selection of centrifugal pumps, and Bulletin 25B 6150B, 32 pp, for a description of equipment for power generation, distribution and control. Any or all of

these booklets are available—specify those wanted. Allis-Chalmers Mfg. Co.

264 Industrial Rubber Products—This is a comprehensive collection of data covering all types of hose, belting, packing and other rubber products manufactured by company, including work gloves and helmets, linings, and hard rubber items. Fully illustrated, provides descriptions, specifications for all products as well as recommended applications. The B. F. Goodrich Co.

265 Separators and Detectors—This illustrated catalog describes permanent non-electric magnetic separators and electronic metal detectors. Specifications on weights, sizes and strength comparisons are given as well as tables of operating capacities for permanent magnetic pulleys, drums, pneumatic line assemblies, pipeline traps, road sweepers and pipe rolls. Eriez Mfg. Co.

266 Vibration Control—The advantages and limitations of spring mountings, rubber mountings and cork materials in the control of vibration, together with data on their use are given in Bulletin C-102. A selector chart tabulates more than 50 applications and recommends types of isolators for both highest efficiency and satisfactory operation under less critical conditions. Loading ranges are given for all types. Also described are isolators for special applications. Korfund Co., Inc.

267 Steel Work Benches—Form 701 is an ordering guide for work benches, illustrating models and providing explanation of features as well as listing dimensions and specifications and available top materials. Also gives ordering data on drawer tiers, continuous benches, bench tops, parts and accessories. Standard Pressed Steel Co.

268 Steam Generators—A bulletin compiled to present information needed for ordering packaged steam generators, this features a large, 2-color cutaway illustration and explanation of design features. Includes full specifications and dimensions as well as test data. Superior Combustion Industries, Inc.

269 Steam Pipe Line Products—Folder 349 is an over-all presentation of manufacturer's products for the distribution and utilization of steam, gas and liquids. Includes photos and brief descriptions of heat exchangers, expansion joints, flow and condensation meters, strainers, traps, and separators. American District Steam Co.

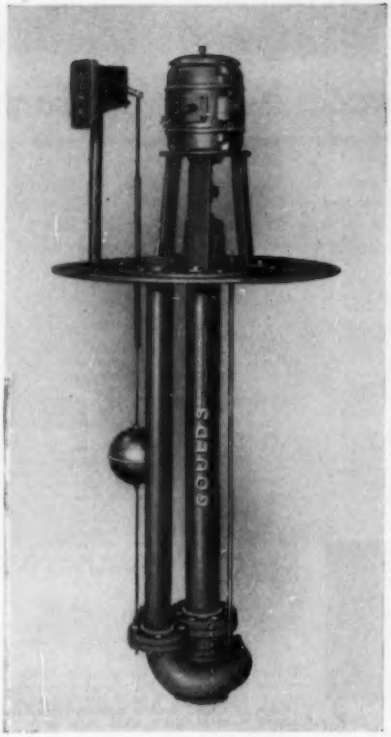
270 Metal and Asbestos Gaskets— This 32-pp catalog covers company's stock gaskets of all types as well as gaskets fabricated to specifications. Illustrated with photos it includes full specifications, dimensions, application data. Also contains engineering data helpful in estimating gasketing needed. United States Gasket Co.

271 Payroll Tabulation—Bulletin TM 598 presents five sample payroll tabulations demonstrating ability of company's tabulating machines to produce payrolls, earnings records, other reports required in payroll procedure. Remington Rand, Inc.

272 Chemical Proportioning Literature—Bulletin CAT lists more than 50 available bulletins and reprints of articles published by manufacturer on the general subject of constant rate and flow responsive chemical proportioning. Material listed covers equipment, methods and applications. "Proportioneers, Inc."

273 Visual Planning Equipment—The importance, application, and cost of three-dimensional planning material is presented in this file of helpful data. Tells reasons why proper planning is basis for manufacturing cost reductions and includes many photos of typical visual layouts. Also quotes prices of visual material and provides instructions for ordering it. "Visual" Planning Equipment Co., Inc.

274 Manual on Overhead Conveying Systems—This comprehensive handbook, Conveying Manual A-86 contains more than 200 pp of information from manufacturer's catalogs on overhead track systems and conveying equipment. Book is generously illustrated with photos of equipment, installation and construction details, and it provdes full engineering and application data as well as complete catalog listings of available equipment. Richards-Wilcox Mfg. Co.



Goulds vertical centrifugal Fig. 3047

For Dependable Heavy Duty Sump and Drainage Service

This rugged, heavy duty sump pump gives exceptional service in removing water from boiler room pits, pipe tunnels, elevator pits, cellars, basements. It is also widely used for transfer service where automatic control of liquid levels in vats or tanks is required.

CAPACITIES Fig. 3047 is available in four sizes for pit depths from 3 to 20 feet. Capacities from 10 to 650 G.P.M. with heads up to 130 feet depending upon capacity.

ADVANTAGES The unit comes complete with float, automatic switch and cover plate. The discharge pipe, pump support column and the cover plate are welded into a rigid unit assuring permanent alignment of upper and lower bearings. Lower bearing is protected by special pressure equalizing system to give long wear.

MEMBER

For complete information call or write Pump Headquarters or your nearest Goulds dealer. Ask for Bulletin 726.1.

Goulds PUMPS INC. Seneca Falls New York

New Products and Methods

WHAT'S NEW? On these pages the Editors summarize the outstanding industrial developments of leading manufacturers who will supply you, free of charge, the bulletins or other information desired. For ease in making requests use the no-obligation, postage-paid card, pages 19 and 85

1—WATER HARDNESS TEST

Is simple titration method utilizing color indicator

Total water hardness, and that caused by calcium alone, can be accurately measured in 1 min, according to manufacturers of this test, which involves a direct titration with a distinct color change at the end point.

The calcium test is similar and the answer is said to be correct to less than 1 ppm of calcium. Where determination of hardness due to magnesium is involved, operator makes total hardness test and calcium test, the difference giving him the magnesium value.

A water sample to be tested for total hardness is measured into a porcelain dish. A little buffer solution is stirred in to bring sample to suitable pH value. Indicating solution is added and stirred. Sample, at this point, is red. Adding the titrating solution turns the color to blue. Disappearance of last trace of reddish tinge marks end-point. In testing for calcium hardness, procedure is identical but with different solutions and final color is a violet blue. Hall Laboratories, Inc.

2—MULTIPLE V-BELT

Is high capacity type, with increased horsepower rating

Said to offer a 40 per cent increase in horsepower rating over comparable sizes of company's standard V-belts used for this service, this belt is also available for use where dissipation of static is essential. Increase in its capacity has been effected without stiffening belt construction or reducing any safety factors, company states, pointing out that the major advantage of the increased capacity belt is that fewer belts have to be used to get power transmission desired. The B. F. Goodrich Co.

3—LUMINAIRES

Two and three-lamp fluorescent types with heavy duty holders

These new industrial units represent a change to the heavy-duty lampholder in company's standard three-lamp unit and addition of a new line of two-lamp units with 5-in. lamp spacing heavy-duty lampholders.

Starters are mounted in lampholders, indexed to associated lamps, and accessible from within reflector without removing the lamps. Danger of lampholder breakage in shipment, installation and maintenance is said to be eliminated. Units come with open-end and closed-end porcelain enamel reflectors.

Complete luminaire consists of a steel hood assembly with lampholders, ballast, and one-piece steel reflector. Hood assembly is heavy gage steel, and ballast and lampholders are wired as part of this assembly. Spring-loaded wing locks hold reflector to hood. Reflectors are heavy gage porcelain enameled steel with average reflection factor of over 82 per cent, company states, and shielding angle approximately 13 per cent. Westinghouse Electric Corp.

4—LUBRICATING OIL

For hydraulic motors, pumps and similar equipment

Gulflite Oil 5W is recommended for use under extremes of both heat and cold. A light oil, viscosity is 90 to 100 SSU at 100 F, company states, and it maintains its body, heavy load-carrying capacities, and nonfoaming and free-flowing characteristics throughout entire range of temperatures in which equipment is normally operated.

According to company, Gulflite Oil 5W is manufactured from high grade solvent processed, paraffinic-type crudes, superrefined by Alchlor process, and compounded with additives to retard oxidation and increase capacity to lubricate parts under heavy loads. This oil is intended to make possible the use of one year-round lubricant instead of winter and summer grades. Manufacturer points out that its use reduces damage from cold weather starts and minimizes leakage at high temperatures. Gulf Oil Corp.

5—SOUND-PROOF BOOTH

For use where master or staff stations are in noisy areas

By placing the intercom station in the Model M-15 Sound Booth, a high percentage of the background shop noises are

absorbed, company explains, and not transmitted in the form of a disturbing blast to the station in the quiet area, permitting two-way conversation between quiet and noisy locations.

This unit can also be used in conjunction with dictating machines, sound system microphones and intercom systems other than those manufactured by company. Of wooden construction, dark brown finish, booth is lined with acoustic insulation board and is 13½ in. in width, depth and height. Costs $13.50. Executone, Inc.

6—CAR SHAKER

For unloading loose materials from open-hopper bottom cars

The Lo-Hed Car Shaker is offered in combination with a 5-t twin hook hoist and controls, or with a single hook 5-t hoist and controls, or separately for use with existing hoisting equipment. According to company, this shaker makes emptying cars possible for one man to handle in a matter of minutes. It is said to afford a fast, easy way to unload coal, sand, coke, slag, limestone and similar materials.

Interlocking controls are provided for increased safety with the motorized trolley hoists furnished with a Lo-Hed Car Shaker combination. In this arrangement the hoist has a slack-line switch. Shaker cannot be operated until it is in position, company explains, and motor trolley cannot be started when shaker is in operation. American Engineering Co.

7—WORK GLOVE

Has natural rubber coating and is made in gauntlet style

The palm and thumb of the new Grab-It Glove are coated with rough-textured natural rubber chemically welded to strong fabric for resistance to abrasive wear and cutting action of sharp-edged or rough-surfaced materials. Back of glove is canvas with knuckle band and elastic insert for snug fit. Edmont Mfg. Co.

8—OIL RESISTING V-BELT

Is high capacity type featuring increased rating

The High Capacity Super-7 Texrope Belt is described as having a 40 per cent higher rating than company's standard belt of this type, while maintaining same stretch characteristics and same safety factor margin. Originally offered for installations where space was limited and standard drive could not be used, this belt now is being used more generally in industry since the price of a complete drive utilizing the high-capacity belt is generally less than for a standard drive. Manufacturer points out, however, that belts of the high capacity type have not been in service long enough to determine their actual ultimate life. Where specified, this belt can be made static resisting. Allis-Chalmers Mfg. Co.

9—STEEL SEPARATOR

Sorts semi-finished and finished products according to composition

The Steelsorter differentiates between types of carbon steel, according to company, by responding to magnetic differences in the metals, regardless of whether the differences are chemical, physical or metallurgical in nature.

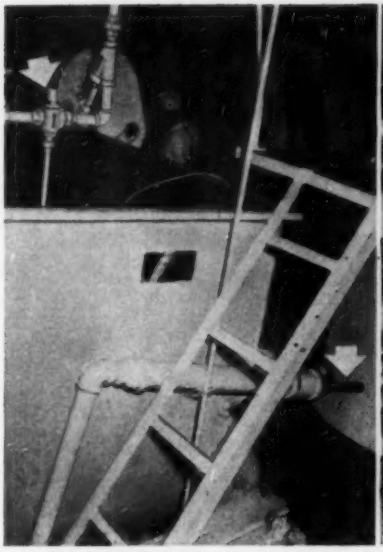
Designed for normal mill stock — rods, bars, fabricated parts — the Steelsorter is described as fast and easy to operate and sensitive to minute differences. With it, one man can separate several hundred small samples per hour, it is claimed, and untrained operators can make separations once the instrument is adjusted. Sample is inserted through opening in top, the button pushed and the dial read.

When separating long pieces the cross-sections must be similar, as the test-piece unit is merely slipped over the ends of the specimens. Small parts of same size when placed in same position in test unit, can also be sorted.

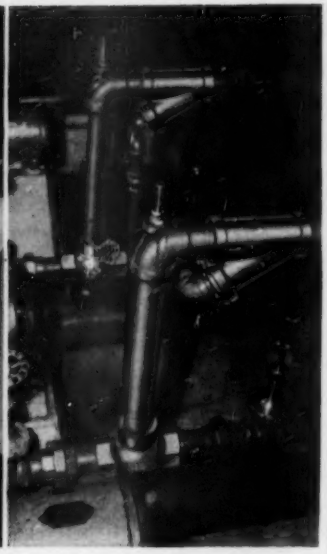
Since the Steelsorter is portable, it can be used wherever line voltage is available. The instrument doesn't mar the surface, according to manufacturer, nor disturb

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 19-20 and 85-86.

THE COST OF COLD



Sarco TR-21 on can cooling



Sarco Blenders on Diesel engines

It's human to play safe and "open her up wide" when cooling is done by hand control. But what is the cost of too much cold and more cooling water than you need?

In Process Cooling

The cooling hook up above handles forty No. 10 tins of syrups or foods per minute. It's a conveyor job with temperatures critical above sixty degrees. Formerly wide open, for safety, Sarco now opens or closes the valves down to a trickle as needed. Production is uninterrupted and absolutely uniform. Catalog No. 700.

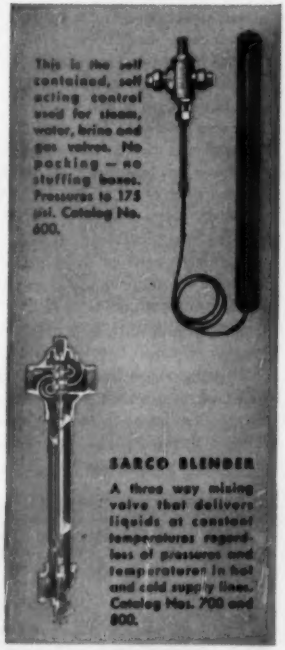
In Refrigeration

Too much cold can be very expensive. For instance, it costs 15% more to cool milk to 37° than to 40°. Brine can be recirculated by the Sarco Blender shown at the right. No waste cold. Also ideal for defrosting, or any cooling operation. Catalog No. 700.

In Engines and Compressors

There is only one temperature of jacket water that will insure against overheating and give highest operating efficiency. At least ⅔ of the metered water was saved on a battery of compressors in Chicago by using Sarco, instead of wide open, "play it safe," hand control. Also water in hot well is now suitable for process work because its temperature is more uniform.

ASK FOR SARCO CATALOG No. 700 ON COOLING CONTROLS


This is the self contained, self acting control used for steam, water, brine and gas valves. No packing — no stuffing boxes. Pressures to 175 psi. Catalog No. 600.
SARCO BLENDER
A three way mixing valve that delivers liquids at constant temperatures regardless of pressures and temperatures in hot and cold supply lines. Catalog Nos. 700 and 800.

257

SARCO SAVES STEAM

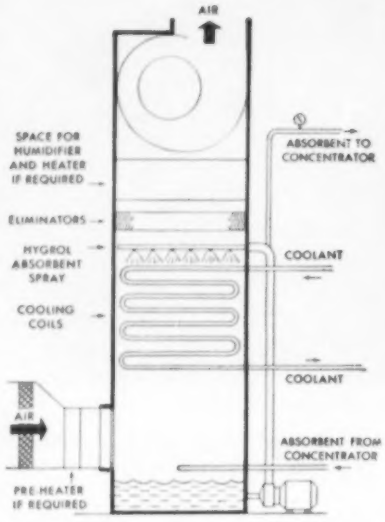
SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 5, ONTARIO

IMPROVES PRODUCT QUALITY AND OUTPUT

New Method Gives Precise Control in Air Conditioning

Niagara "Controlled Humidity Method" Uses Hygrol, Hygienic Liquid Absorbent

● The Niagara "Controlled Humidity Method" is a new system of air conditioning giving complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Especially, it provides dry air at normal atmospheric temperatures with little or no refrigeration required. A condition of 15 grains of moisture per pound of air at 85 deg. F. dry bulb temperature has been produced without refrigeration.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

The apparatus is enclosed in a casing thru which the air is drawn by fans. The air is filtered and then enters a chamber where it is dehumidified in passing thru a spray of "Hygrol" Liquid (a hygienic hygroscopic chemical that absorbs the air-borne moisture and contains no salts or solids to precipitate). In the same chamber are located cooling coils which remove the latent heat of evaporation and also sensible heat as required.

The absorbent liquid spray falls into a tank at the base, where it is piped to a concentrator, removing moisture taken from the air. The re-concentrated liquid returns to the system. This process is continuous, and the apparatus operates at full capacity at all times.

The same equipment may be used to provide winter air conditioning when required, by installing a tempering coil at the outdoor intake, an humidifier, and a reheat coil above the eliminators.

This equipment is manufactured in a range of sizes providing from 1000 to 20,000 CFM of conditioned air from a single unit, and mutiple unit installations are practical. It is expected that, by reducing the need for refrigeration, the cost of air conditioning will be reduced by this method. Applications generally are in a temperature range from 35 deg. F. upward. Below the freezing temperature of water, the Niagara "No-Frost" method is applicable.

The equipment is protected by U. S. and foreign patents. Installations have been made in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, in air conditioning for laboratory control and for human comfort.

For further information, write Niagara Blower Company, Dept. PE, 405 Lexington Ave., New York 17, N. Y.

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 19-20 and 85-86.

physical properties when used with highly-finished products. In addition to voltage and sensitivity controls there are coarse and fine range adjustments.

The Steelsorter has five test-pieces, of different sizes, with cylindrical openings

$\frac{1}{2}$ to $9\frac{1}{2}$ in. dia. Instrument operates from a 110 v, 50-60 cycle a-c. Control unit costs $295.00, test-piece units cost $85.00 to $175.00 and extra 12-ft cables are $11.50. Jones & Laughlin Steel Corp.

10—BURDEN CARRIER TRUCK

Is battery powered electric unit with end dumping mechanism

Designed for bulk handling, the Model A-1015-9 dumps by gravity when released by lever near operator. Body dumps cleanly and returns to lever latched position when emptied, according to manufacturer.

Body capacity is $1\frac{1}{2}$ cu yd and truck load capacity is rated at 6000 lb. Truck chassis has four-wheel lever type steering, double reduction drive axle, semi-elliptic spring suspension and mechanical contactor travel controller. Mercury Mfg. Co.

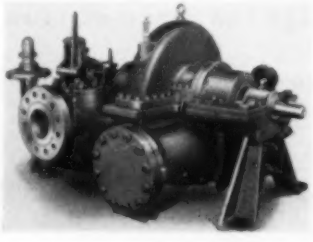
11—SINGLE-STAGE TURBINE

Is standard model, for high pressure, high temperature service

The CP Turbine is engineered for initial pressures to 1450 psig, initial temperatures to 950 F and back pressures to 300 psig. It is a single-stage, mechanical drive turbine and has labyrinth shaft seals to prevent leakage, reduce losses and maintenance.

To provide for extreme thermal expansion, the turbine is supported at the true centerline, company states, and front end is mounted on a flexible channel. This method of mounting is said to permit both radial and axial expansion to take place without disturbing shaft centerline.

Turbine can be furnished with any of eight governor types, including mechanical shaft, vertical flyweight with or without oil relay, pressure governors for pump and blower drives, and auxiliary tripping devices. A separate trip operating inde-



pendently of governing system is provided for protection against overspeeding. Made in three sizes for capacities up to 3000 hp. De Laval Steam Turbine Co.

12—FLY ASH COLLECTOR

Is low resistance type intended for small boiler plants

The LR Fly Ash Collector was developed to meet requirements of the small, modern boiler plant of 100 to 2000 developed boiler horsepower, whether fired by hand, or by underfeed, traveling grate or spreader stoker. It is said to combine high efficiency and a low draft loss, adapting it to natural draft as well as economical operation under mechanical draft. Buell Engineering Co.

13—ANTI-STAIN

For addition in small amounts to static rinse tanks

According to manufacturer, Rins-Aid forms a water-repellent film on freshly plated work and leaves the work dry. A concentrate, Rins-Aid is added to the water rinse in the amount of about 10 oz per 100 gal of water. Although Rins-Aid may be used in final rinse, it is recommended that it be added to tank just before last dip.

Among advantages stressed are freedom in after dip work from water staining of chrome, nickel, cadmium or zinc; a buffed, improved appearance to surface; greater ease of drying, and use of lower temperature in final hot water rinse. R. O. Hull & Co., Inc.

14—MAINTENANCE TRESTLE

For painting, wall washing, storeroom work, construction jobs

Work can be performed at many heights with this trestle. It is available with or without locking casters, having adjustable stem intended to permit use over stairways and on other non-level surfaces.

Basic trestle assembly consists of two 5 ft base sections, two regular heads which are reversible, an 8-ft trussed overhead ladder, four rubber casters on 30 in. stems.

This unit stands 7 ft high and its parts can be arranged to supply a platform at any height from 1 to 8 ft above floor. Additional height is obtained by adding extra ladder sections in 3 or 6 ft. lengths. Diagonal braces are used.

Trussed catwalks are covered with an expanded metal tread and may be spaced to provide one to three or more working levels. Rolling towers can be assembled by combining two or more trestles. Optional accessories include 8-ft trussed plank rest, guard rails, side brackets, combination reversible head, and low base for narrow passageways. Bil-Jax, Inc.

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

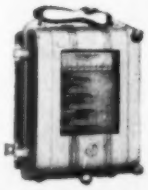
How to spot trouble before it starts!

GE HOOK-ON VOLT-AMMETER

for fast electrical checks!

AF-2 LOAD VISUALIZER
5 instruments in one—measures watts, volts, amperes, vars, power factor.

AP-9 A-C VOLTMETERS AND AMMETERS
For general testing—highly accurate, sturdy.



CF RECORDER
Uses no ink—inexpensive records.

You can make electrical checks in a hurry—and easily—with the G-E hook-on volt-ammeter. To measure voltage, just clip the voltage leads to convenient terminals or binding posts. There's no opening of conductors—no interruption of service.

Among its many uses, the hook-on is ideal for motor testing. In a jiffy you can learn whether motors are overloaded or perhaps under-loaded to a wasteful degree. Costly shutdowns of motors, transformers, other loads can be prevented by periodic checks.

The hook-on volt-ammeter has six ranges: 0-15/60/150/600 amps, and 0-150/600 volts a-c. Extension poles available for use on high-voltage circuits or hard-to-get-at locations. For this and other handy G-E testing instruments see your local G-E distributor or write Apparatus Department, General Electric Company, Schenectady 5, N. Y.

Manufacturer's suggested retail price, AK-1 hook-on volt-ammeter **$74.75**

GENERAL ELECTRIC

602-171

15—PIPE WRAP

Is insulating material for sheet metal ducts, steam traps

The manufacturer of this asbestos insulation points out that, due to light weight and easy handling characteristics, it costs less than 6 cents per sq ft on most applications. It is made of sheet of corrugated asbestos bonded to a sheet of aluminum foil which is said to reflect 95 per cent of all radiant heat. The sheets are fitted to pipes or ducts with a slight over-lap, secured by standard insulation bands. Alfol Div., Reflectal Corp.

16—DISPENSING UNIT

Is wall-mounted metal type for eyeglass cleaning tissues

This unit holds a supply of Sight Savers, silicone impregnated tissues for cleaning glasses and safety goggles. It can be located wherever convenient and is said to promote increased safety by making it handy for employees to remove grime and dust from lenses as frequently as required. Both dispenser and refill packets now available. Dow Corning Corp.

17—MASONRY COATING

Is silicone product with high penetrating properties

Invisible Rainchek is colorless when applied to masonry surfaces—whether colored or white—and does not discolor after prolonged periods of weather exposure, company reports. It is said to penetrate deeply into cement blocks, concrete, brick, unglazed tile, stucco and other surfaces and gives permanent protection against moisture and water.

This coating is further claimed to guard against water seepage through basement walls and floors and to protect outside walls against discoloration by absorption of atmospheric moisture laden with dust. Invisible Rainchek is also said to retard passage of moisture through masonry walls and control efflorescence or deposit of alkaline salts on the surface.

Coating may be applied to walls painted with water paints and is also recommended for application to masonry surfaces to be subsequently painted with oil paints. Available in quantities from 1 gal to 55 gal. Protection Products Mfg. Co.

18—PENDANT SWITCHES

Normally-open or normally-closed types, feature long service

The No. 1AH2 and 1AH3 pendant switches have compact plastic housing and hand-fitting contour. These switches are Underwriters' Laboratories listed for 10 amp, 125 or 250 v, a-c; ¾ hp motor at 115 v,

1½ hp 230 v, a-c. High electrical rating is combined with high inrush capacity, company states, to make them suitable for controlling tungsten filament lamp loads of 1000 w on a-c circuits. Over-all length of housing is 4-1/16 in., width is 7/8 in. and height is 1-11/16 in. Micro Switch.

19—QUICK FASTENING CLIP

Is driven like a nail through insulation into wood surface

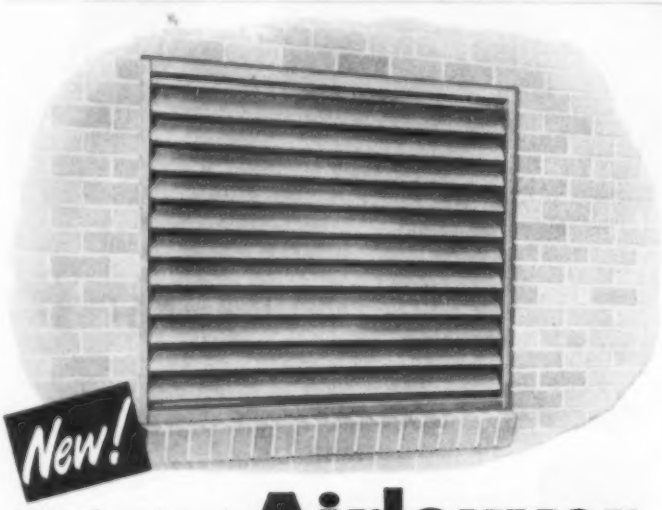
The Speed Clip is for fastening insulation, asphalt shingles, rolled roofing and plasterboard to wood. It has a broad, flat head to simplify driving and afford a large surface for maximum holding. A sharp point is provided to make fastener easy to start and an extra long taper to minimize resistance to penetration and there's a barb on each side to prevent loosening. Clip is produced for insulation 1 in. thick. Tinnerman Products, Inc.

20—UNSCRAMBLING TABLE

For high speed handling of tumblers, other tapered containers

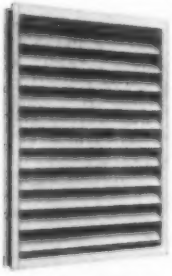
The improved Straightline Unscrambling Table was engineered to overcome the difficulty in handling groups or masses of

tapered containers caused by their tendency to fall over or surge upwards away from the conveyor belt when they are crowded together. It consists of a steel plate so placed above the moving belts of



The Swartwout **Airlouver**

Fill any wall opening with one or more weather-tight units tailored for the need



...without premium cost

Now you can equip any opening in new or old buildings with a pleasing pattern of equal size louvers. Swartwout's unique Airlouver system enables you to secure odd size louver units priced economically. Strong formed channel frame construction houses overlapping blades that assure weather-tightness. Several optional operating methods — various types of mounting facilities. Write for Bulletin 339D.

18511 Euclid Avenue, Cleveland 12, Ohio

The Swartwout Co.

Industrial Ventilation Specialists Since 1904

Equipment for Controlled Air Circulation

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

the unscrambling table that its undersurface just clears the tops of the tumblers, to prevent them from tipping over or pushing upward.

The restraining plate has vertical adjustments so it can be adjusted to size of container. Company points out that this table also handles conventional containers, ovals, flasks, and irregular or odd shaped containers. Island Equipment Corp.

21—STEAM GENERATOR

Is designed for either oil or gas firing with same nozzle

The high atomizing burner nozzle used in these boilers incorporates a primary supple intended to assure precise injection of fuel and air for efficient combustion at all firing rates. In addition, this nozzle design is claimed to permit interchangeable oil or gas firing.

Generators also include simplified air supply system, improved combustion and ignition programming controls, company reports, as well as a blower-air channel design that achieves quiet operation. Available in sizes from 10 to 300 hp, pressures from 15 to 200; b. Cyclotherm Corp.

22—TUBE BENDERS

Hand or bench models covering ranges from $\frac{3}{8}$ to $1\frac{1}{4}$ in.

These benders are designed for quick and economical bending of tubing, either in production or intermittent use. The bench bender, ranging from $\frac{3}{8}$ to $1\frac{1}{4}$ in., may be post, bench or stand mounted. Two hand benders, Models 38 and 39, cover ranges of $\frac{1}{4}$ to $\frac{1}{2}$ in. and $\frac{5}{8}$ to $\frac{3}{4}$ in. Tubing of soft copper, brass, aluminum, or fully annealed steel may be bent to desired angles, company states, and shapes may be bent with special radius blocks. Republic Mfg. Co.

23—COOLANT PUMP

Is foot powered for use on drill press, milling machine or bench

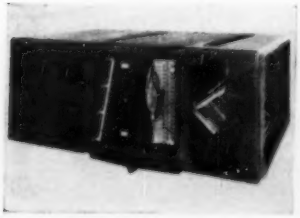
The Lubri-King consists of a heavy steel tank holding approximately 2 gal of lubricant or coolant, equipped with foot pump, 5 ft of plastic hose, and nozzle attachment with bracket than can be attached to most types of machines. Stroke of foot pedal ib pump controls the amount of fluid delivered to cutting tool —as little as a few drops or a strong stream. Where re-use of fluid is required it can be returned to tank where it is strained through a 50 mesh screen included as standard equipment.

Unit weighs less than 10 lb empty and can be moved from one machine to another. Tank is 20-gage steel; pump, check valves and fittings are brass. A 5-ft length of oil resistant plastic hose with nozzle and bracket is included. W. A. Horejsi Co.

24—AIR HANDLING UNITS

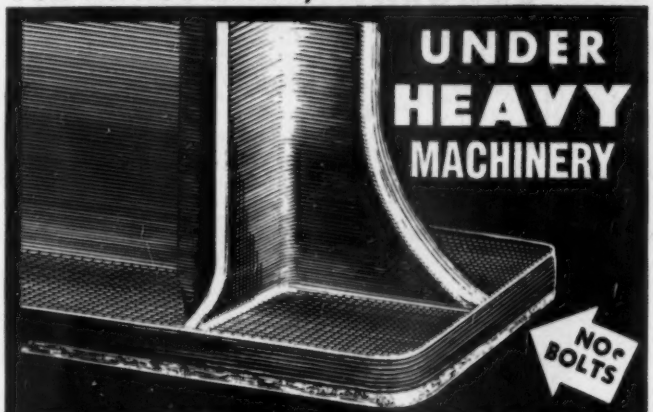
For remote installation in central air conditioning systems

These units, Types AH and AV, are also recommended for use in commercial and industrial heating and ventilating. Sizes



FABREEKA

FOR IMPACT SHOCK, VIBRATION AND NOISE



SAVES FLOORS AND FOUNDATIONS

In its field the uses of Febreeka are unlimited . . . for reducing the destructive effects of heavy impact shock and transmitted high frequency vibration . . . and for reducing noise.

- USED "IN COMPRESSION" Gives High Safety Factor
- GREAT STRENGTH—LONG LIFE
- NO TROUBLESOME PERMANENT SET
- CONTROLLED RESILIENCY
- EXTREMELY HIGH DAMPING
- GREAT STABILITY

GET Your COPY

Used In And Under Heavy Machinery Since 1934

SAVES INSTALLATION COSTS

No Bolts Needed When Used With Fabreeka Cement

HELPS IMPROVE QUALITY AND QUANTITY OF PRODUCTION

SAVES MAINTENANCE

Less Metal Fatigue
Fewer Breakdowns
Less Down Time
Less Upkeep

SAVES $ MONEY $

SEND FOR "FABREEKA IN INDUSTRY"

FABREEKA PRODUCTS COMPANY, INC.
222E SUMMER ST., BOSTON 10, MASS.

Please send FABREEKA IN INDUSTRY—your New Folder describing Fabreeka, the unique and proven material for absorbing impact shock, vibration and noise.

NAME .....
TITLE .....
FIRM .....
ADDRESS .....

Get MORE JACKING POWER LONGER JACK LIFE

Simplex HYDRAULIC JACKS

Dependable performance, day after day on difficult jobs, produces reports like these from Simplex Hydraulic Jack users. Engineered for faster, safer jacking, with *no* maintenance cost, every Simplex Hydraulic has these superior features:

LEAKPROOF, WEARPROOF, high pressure packing seals of Neoprene.
SPRING CONTROLLED, NON-STICKING, Ball Valves for trouble-free operation.
HORIZONTAL or VERTICAL OPERATION with double lever sockets to speed work.
SMOOTH ACTING RAM of SAE X1112 steel, machined and ground to minimum tolerance.

Put a Simplex Hydraulic to work on your tough jacking jobs to save time and manpower. Available in eight models with capacities from 3 to 100 tons — safety-tested to 50% over rated capacity.

SEND TODAY FOR BULLETIN: HYDRAULIC 49

Simplex MYGS SCREW HYDRAULIC Jacks

TEMPLETON, KENLY & CO.

1066 South Central Avenue
Chicago 44, Illinois

range from 1650 to 14,050 cfm at 50 fpm coil face velocity when direct expansion coils are used and up to 18,000 cfm when water coils are used. Standard and double tube steam heating coils are also available. All coils have continuous plate fin construction.

Each unit consists of a fan section—with two backwardly inclined blade fan wheels mounted on a common shaft—and a coil section with drain pan for cooling and heating coils, depending on requirements. Filter sections, face and by-pass dampers, other accessories are available. The coil section accomodates heating and cooling coils and optional face and by-pass dampers. Cooling and dehumidifying are provided for summer; heating and humidifying for winter. Sturtevant Div., Westinghouse Electric Corp.

25—LIGHT DUTY FLANGE

Is intended for slow speed anti-friction bearing applications

The Flangette is described as a simple arrangement of two pressed steel stampings to form an inexpensive flanged housing enclosing company's self-aligning wide inner ring type ball bearing. Light weight, low cost, factory sealed-in lubrication, and ease of installation are listed as advantages of this power transmission unit.

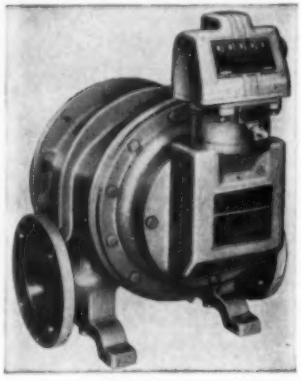
The Flangette is available for shafts of 18 sizes ranging from ½ to 2-3/16 in. It is expected to find uses in light duty conveyors, dryers, tumbling barrels, food mixing equipment. The Farnir Bearing Co.

26—ROTARY METER

Is light, compact, for high speed fueling, liquid measuring

The Rototrol is a 350 gpm rotary meter. Complete dynamic balancing of rotor assembly is said to preserve accuracy and lengthen meter life by eliminating hydraulic and mechanical stresses. Stainless steel ball bearings and needle-type roller bearings on rotor shaft and cam rollers are claimed to provide free running action.

Interior rotating parts are aluminum die



cast, anodized aluminum and cadmium plated steel. Positive displacement measurment is accomplished in a precision chamber during each quarter revolution of rotor, comany states, and a simple gear change permits flow through meter in either direction. Meters are for working pressures up to 125 psi, standard 3 in. pipe flanges, may be installed vertically or horizontally. They are available with large number, straight-reading dial or ticket printer. Dials can be set to face any of 8 directions. Bowser, Inc.

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

HEAT FUMES } A TOUGH CORROSIVE TEAM TO BEAT . . .

You can do it with DAMPNEY SILICONE Coating Aluminum

Try this material *first* if you would not be deploring, several failures hence, the apparent lack of a protective coating to meet your standards for fume-resistant surfacing to 750°F.

Not just another aluminum-pigmented paint, Dampney Silicone Coating contains resins sufficient in quantity to impart to it all of the unique heat stability, low moisture absorption and exceptional durability of silicones.

Wherever metal is exposed to continuous heat, or to intermittent heating and chilling — in heavily fume-contaminated atmospheres either sheltered or under severe weather exposure — Dampney Silicone Coating will keep it securely corrosion-free longer.

That it does so at a cost no greater in terms of material, labor and equipment down-time than you may now be paying for considerably less resultful performance is a plus value to be realized in this product of Dampney Maintenance for Metal.

When you have all the facts about Dampney Silicone Coating, we believe you'll want us to quote on your specific applications. Why not give us the details now – when you're writing for Bulletin 1570.

100-1 MAINTENANCE FOR METAL

THE DAMPNEY COMPANY OF AMERICA
HYDE PARK, BOSTON 36, MASS.

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

27—SOLDERING UNIT

Operates on conduction principle, has 24 heat selector

The Wassco Glo-Melt is intended for all soldering operations, including silver soldering and brazing, and for handling both light and heavy work. With capacity said to equal a 450 w heavy electric iron, soldering is done with a 5 oz handpiece.

Upon contact with work the tip of the copper jacketed carbon "pencil" glows red and the flux-core solder flows when touched to pieces being joined. When removed from the work carbon immediately cools, company explains, and power is used only when contact is maintained. Tips may be ground to various shapes.

The Glo-Melt is recommended for production and assembly line operations as well as intermittent service. Unit weighs about 25 lb and is approximately 7 by 7 by 7 in. Wasserlein Mfg. Co. Inc.

28—LIGHTING PANELBOARDS

Are narrow, to fit in web of 8 in. wide-flange structural beams

The beam commonly used in construction of industrial plants has a 7½ in. wide space between flanges for lighting panelboard assembly. The narrow cabinet design of this assembly, Model NMO-XX, which measures 6⅞ in. wide outside, permits ample clearance for installation.

Panelboard incorporates thermal-magnetic circuit breaker units that "plug-in" on cylindrical bus bars and are interchangeable with those of company's NMO panelboards, MO panelettes and MO-12 and MO-20 load centers. Box has outward flanges to allow full space on each side of interior for wiring. Top and bottom wiring gutters are 5 in. each and side gutters 1⅛ in. Cable trough and pull boxes can be supplied for concealing main and branch circuit wires.

Panelboards are available for both single phase 3-wire and three-phase 4-wire services with 15, 20, 30, 40 and 50 amp branch circuits. Square D Co.

29—HALF PINT TORCH

Is self-pressure type, with soldering iron rest, windshield

The little "half-pint" torches (No. 59 for gasoline and No. 60 for alcohol) are said to be low priced and they have 3½ in. dia tanks of heavy-gage brass to minimize tipping. The tank holds 7½ oz of fuel, company states, and torch will burn 3½ hr full open at 1700 F by pyrometer reading. A brass wire, interwoven with the wick, conducts heat from burner into tank. Turner Brass Works.

30—FERRULE CRIMPING TOOL

For making on-the-job hose repairs or installations

Described as sturdy and lightweight, this simple tool utilizes as the crimping medium two strands of music wire in loop form attached to operating handles so that closing the handles contracts the loop. Tool is designed so same wires make a wide range of loop sizes to permit servicing of hoses from ½ to 1½ in. OD. Said to require little or no maintenance. Operating instructions included. A. Schrader's Son Div., Scovill Mfg. Co., Inc.

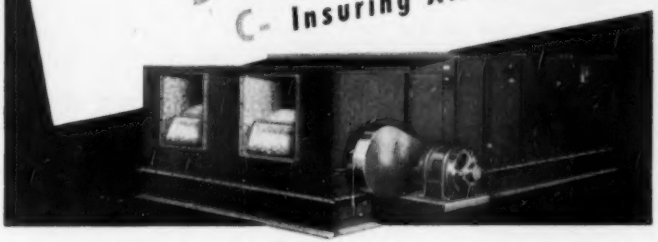
31—ELECTRIC CABLE REEL

Is intended to save time and labor and reduce wear on cable

The 3000 Series Powereel for handling heavy cable is rated at 75 amp at 220 v and designed for use with any current. Collector ring permits winding or unwinding cable without interrupting service, company explains, and three or four of

One HEAVY-DUTY CLARAGE Unit for:

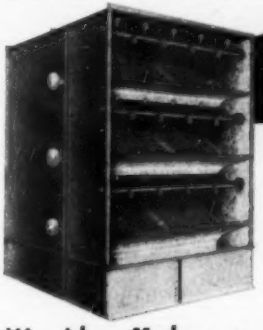
A- Controlling Temperature
B- Controlling Humidity
C- Insuring Air Cleanliness



Use Clarage Capillary Air Conditioners where *maximum air cleanliness plus accurate control of temperature and humidity* are vital to production, uniformity of product, health or safety.

These Capillary Conditioners are completely assembled units, including a capillary cleaning section, pump, heating coils, fans, drive and motor. Built in seven sizes — 1,800 to 20,000 cubic feet of air per minute, either vertical or horizontal units.

There are excellent reasons for preferring this modern equipment: (1) *Inexpensive to install* — no costly building alterations required; (2) *Everything in one "package"* — no parts to assemble; (3) *Proper performance* assured by factory tests; (4) *Low first and operating costs* — the result of shrewd, advanced engineering.



CAPILLARY AIR WASHERS
4,400 to 132,000 CFM

Clarage Capillary Air Washers are widely used where you need air cleanliness only (temperature and humidity control not desired), or they may serve as the cleaning units in complete air conditioning central systems. Built in 5 height and 11 width sizes.

All Clarage equipment is HEAVY-DUTY; *fully equal to severest industrial requirements.*

We Also Make: Complete Line of Industrial Fans . . . Unit Heaters . . . Air Conditioning Equipment . . . Mechanical Draft Apparatus

CLARAGE FAN COMPANY — *Kalamazoo, Michigan*

CLARAGE
—HEADQUARTERS for Air Handling and Conditioning Equipment

SEE OUR CATALOG IN SWEET'S

It pays to direct fan inquiries our way . . . phone Clarage office in your city, or write us at Kalamazoo.

Application Engineering Offices in All Principal Cities

Shaft Packing No Chemical Can Attack

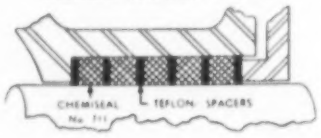
Teflon "Chemiseal" #711 Packing Stays in Service Months Where Other Packings Failed in Hours

"We've got a pump handling hypochlorites," a paper manufacturer told us, "and we can't find a packing that will last more than 5 hours." So we sent him a set of Chemiseal #711. It went into continuous service in November. It's still in there and going strong months later.

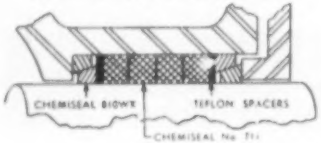
A steel plant tried a #711 packing last summer on a pump handling coke liquor. Recently they ordered #711 for 40 more pumps.

There are hundreds of similar cases in our files.

CHEMISEAL #711 SHAFT PACKING



CHEMISEAL #711WX SHAFT PACKING



No chemical — acid, solvent, caustic, oil or gas — can attack or dissolve a Teflon Chemiseal #711 or #711WX packing. "Chemiseal" non-corroding, non-contaminating, heat-resisting gaskets, packings, adapters and expansion joints can save you hundreds of dollars and countless production delays.

Phone, write or bring your gasket and packing problems to —

UNITED STATES GASKET CO.

648 N. 10th Street

Camden, New Jersey

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

these beryllium copper rings are standard equipment.

Available as an optional extra is a two-wheel hand truck consisting of handlebar and separate axle with rubber tired wheels. When attached to the Powereel it permits one-man operation of the unit even when loaded to capacity. Without hand truck, twin handles of combination handle and cord guide are designed to permit two-man handling of heavy cable.

Standard models of Powereel weigh 21 lb, with truck 30 lb. Capacity of reel is governed by size of cable used. Reel has adjustable brake and lock to control rotation, reel flanges to provide wide-diameter winding. Industrial Electrical Works.

32—POWER DRIVEN SCYTHE

Is portable tool for cutting grass and weeds on plant grounds

The Scythette is designed to reach "hard to get at" places. It is ideally suited for close trimming around buildings or clipping under fences and around trees, company states, and its cutting blades can be submerged in water to cut underwater growth. Scythe weighs 24 lb and is described as well balanced. Its portability permits operator to trim high slopes or rough, rocky terrain. A 1¼ hp two-cycle engine activates 20 in. heavy duty blades through an aluminum torque tube. Unit has self-contained 1 pt gas tank. Hoffco, Inc. Div., Hoff Sheet Metal Works, Inc.

33—STOPPING DEVICE

For emergency use on tank cars carrying petroleum products

The Whopper Stopper is designed to prevent loss of material resulting from defective tank car outlet valves and lodged foreign material. With the Whopper the wild flow may be stopped as soon as the device is in place, company states, adding that contents may be unloaded though it, if desired, to eliminate necessity of unloading from overhead.

Besides preventing loss of material this stopper is said to reduce risk of fire or explosion or personal injury. Made of neoprene, magnesium, brass and aluminum. Height 16¼ in.; length, including handles, 60 in.; weight 10 lb. Industrial Products Co.

34—AMMONIA COMPRESSORS

To handle from 15 to 275 hp equivalent of refrigeration

The high speed V-W Compressors, because of their cylinder arrangement, are said to offer increased freedom from vibration, and are credited with long service life because cylinder liners and other parts subjected to wear can be readily removed for replacement. Most parts are interchangeable.

Upper floor mounting without special foundation is made possible by static and dynamic balance of compressors, company states, and because of their compact design less floor space and head room are required. Compressors are available for use with remote condensing equipment (either water cooled or evaporator cooled condensers), and are designed with 4, 6, 8, 12 and 16 cylinders and for direct connection to motor. York Corp.

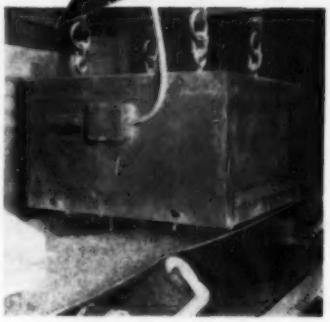
35—AUTOMATIC GAGE

Is self-indexing rotary type for use on press brakes

The Humphrey Rodex Gage is designed to permit production of as many as four different bends in a piece of metal before it leaves the operator's hands. Ease of setting, accurate gaging and saving of handling time are features claimed for it.

Gage consists of rack and gear assembly designed to automatically rotate adjustable gage stops into position and hold them securely until bend is made. Provision is

How to eliminate lawsuits magnetically



There is no tramp iron separator more powerful than the big Dings Triple Pole Rectangular Magnet illustrated above. Ask for Bulletin 301-A.

A needle manufacturer protects his customers with the guaranteed-for-life Dings Alnico Perma-Plates below—and saves $80.00 a week labor to boot! Bulletin B-1205A.

TACKS are tough on teeth! Policemen's stars aren't so good for a valuable milk cow's digestive tract. These two actual cases ended up in court with the plaintiffs seeking damages from the food processor and the feed dealer. If you are in a business where tramp iron can hurt your customers, a powerful Dings Magnetic Separator is better than a lawyer! Wherever magnetic separation can serve, you can depend on:

DINGS MAGNETIC SEPARATOR COMPANY

4766 W. Electric Ave., Milwaukee 14, Wis.

Dings Certified MAGNETIC STRENGTH

made for dis-engaging rack from gears to permit use of gage as a single-stop gage, company says, and gage stops are located in rotating member to meet most bending requirements. General Gas Light Co.

36—DECAL SETS

For quick identification of three types of fire extinguishers

These three decal sets help locate and select the proper extinguisher for: (1) fires of wood, paper and rubbish; (2) electrical, gas and chemical fires, and (3) fires any origin except electrical. An 8 by 9 in. decal is supplied for application to wall above the extinguisher, and a smaller one, $1^3/_4$ by 2 in., for the extinguisher itself. The decals identify in three ways: by color code, by design, and by printed instructions naming proper use.

The selection sign for the wood, paper or rubbish fires has black and yellow diagonal bars. For electrical, chemical or gas fires, the design has red and white horizontal bars. The third decal identifies foam type fire extinguishers suitable for any but electrical fires. This pattern uses red and white horizontal bars cut diagonally by yellow and black stripes. These patterns are reported to speed up selection of correct extinguisher, especially when employees have color deficiencies or are unable to read. Meyercord Co.

37—GLASS COATINGS

For industrial applications, in transparent or opaque finishes

Tuf-On Glo-Dur Coatings are designed to adhere tenaciously to glass and ceramic surfaces. They may be applied by dip or spray and are described as fade-resistant and flexible enough to resist embrittlement after hundreds of hours of heat exposure. Baking time is 6 min at 300 F. Brooklyn Varnish Mfg. Co.

38—RUBBER-SEAT VALVE

For applications where positive shut-off is necessary

According to manufacturer, the No. 33 Valve is drip tight with water at 100 psig and air bubble tight at 80 psig under temperatures to 275 F and -40 F. It is explained that under pressure, due to the $12^1/_2$ deg angle of closure, the rubber yields both radially and longitudinally around the shaft-bosses and the periphery of the valve to insure positive shut-off. The rubber seat is replaceable, but is expected to give long service without leakage.

These 30-in. heavy duty valves are attached to a 30-in. American Standard Tee and provided with handwheel controls with declutching mechanisms and outboard gooseneck bearings. They can be operated individually, in unison, or adapted to automatic control, and are recommend for mixing purposes, reversing valve on condenser water. R-S Products Corp.

39—MOTORIZED HOSE REEL

Is designed for conveying of inflammable and volatile material

The motor used in this hose reel is classified as Underwriters' Approved Class 1, Group D, explosion proof, heavy duty with permanently lubricated bearings, according to manufacturer. It is designed to be installed and connected with conduit for a sealed installation. The drive, using two sprockets and chain, is described as quiet and positive. A sealed push button is the only control used.

Reel and motor unit is available for truck installations and can be supplied complete with junction box, push-button switch, tubing, fittings, cable, twin wire,

(Continued on page 89)

Do you want more information on this equipment and its application? Use the no obligation, no postage card between 18-19 and 85-86.

NOT 1 CENT for Repair Parts for 444 Nicholson Steam Traps Installed in 2 Years

Here is added evidence of the remarkably low maintenance costs of Nicholson expansion steam traps. In the 2 years Bradshaw & Co. have been distributing them in the Pittsburgh area they have installed 444 traps. But they have received not one order for repair parts. And examination of traps in continuous drainage service for at least 18 months, at steam pressures to 250 lbs., showed no sign of valve cutting.

Pressure: 0 to 250 lbs. without change of valve or seat. Length: 18" to 40", 2 types: thermostatic, continuous flow.

Easily Installed, Low Cost

Because valve is easily adjusted to pass condensate at any temperature below 212° F., these traps are also widely used for regulating temperature of equipment.

FOR ALL EQUIPMENT Using Steam or Hot Water

Radiators	Dry Kilns
Separators	Vulcanizers
Paper Machinery	Switch Heaters
Pipe Coils	Laundries
Kettles	Plastic Molding
Railway Coaches	Presses

CATALOG 448 or see Sweet's

W. H. NICHOLSON & CO., 208 Oregon St., Wilkes-Barre, Pa.

The 7-Range Clip-On Volt-Ammeter

FERRANTI

Offers These Important Advantages

- Measures up to 1000 amps. up to 600 volts.
- Convenient ONE HAND operation trigger action.
- Thumb operated range selector switch.
- 7 ranges—5 current and 2 voltage.
- Insulated core—shockproof construction.
- Takes cables up to 2¼" diameter.
- Distinct calibrations—easy to read.
- Suitable for 50-70 cycles.

RANGES: 0-10 amps; 0-25 amps; 0-100 amps; 0-250 amps; 0-1000 amps; 0-150 volts; 0-600 volts.

FERRANTI ELECTRIC, INC.

50 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

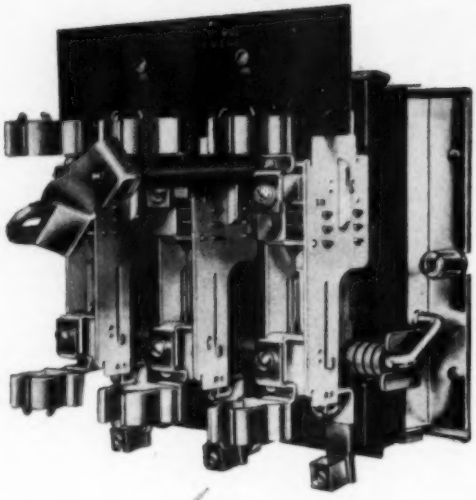
FERRANTI, LTD., Hollinwood, England — FERRANTI ELECTRIC, LTD., Toronto, Canada

NOW...an ALL-NEW Type A Safety Switch for modern high-capacity distribution systems...

TRUMBULL'S

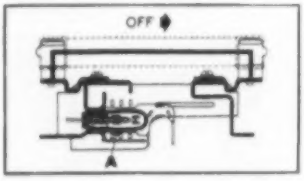
HCI

HIGH CAPACITY INTERRUPTER

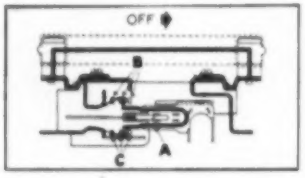


Unusually high interrupting capacity..."circuit-breaker" action breaks heavy loads quickly, safely. Extremely high momentary current capacity . . . withstands heavy short circuits without damage. 30-, 60-, 100-ampere sizes.

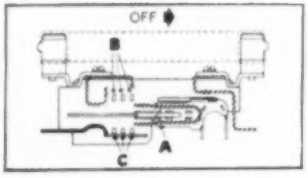
Here's How...
HCI's "Circuit-Breaker" Action Works



1. Switch closed. Spring-loaded sliding contact (A) fully inserted between stationary contacts. Heavy line is current.



2. Sliding contact being withdrawn. The two arcs repel each other, are drawn against grid pins (B) and (C), which break and cool them.



3. Contact fully withdrawn. Trumbull's unique "Circuit-Breaker" action has effectively extinguished the arcs.

CHECK THESE ADDITIONAL SPACE-SAVING, TROUBLE-PREVENTING, LIFE-LENGTHENING FEATURES

Center-front operation permits close ganging.

Front fusing allows compact box, yet gives ample wiring space.

No exposed live parts when switch is OFF and door is open.

Handle interlock.

Clear ON and OFF markings both inside and outside.

No dead center—roller-cam action (multiplying linkage design with powerful spring) throws switch to full OFF and ON.

Poles are self-contained switching units for easy replacement.

Silver-plated current-carrying parts prevent oxidation . . . give low-resistance contact.

Insulating parts made of linen melamene, light, strong, arc-resisting.

Enclosed operating mechanism (on 60- and 100-amp. sizes) prevents wire chafing.

Interior removable for wiring ease.

Underwriters' approval throughout.

For more information about Trumbull's all-new HCI Safety Switch, write for your free copy of Bulletin TEC-10 today. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Connecticut.

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

Bulletins on Current Plant Problems

(Continued from page 20)

PAINTS, COATINGS

143 Protective Coatings—Bulletin I-SR-4 gives an over-all presentation of company's specific products for meeting water and dampness control problems. Lists 10 protective coatings and their recommended uses. Includes general specifications and pointers for coating of exterior walls. The Flintkote Co.

144 Aluminum Paints—This interesting folder on specialty aluminum paints describes in detail even to prices, six types of aluminum paints. These include one for applying directly over rusted surfaces, a heat-resisting interior aluminum paint, a heat-resisting exterior aluminum paint, acid and alkali resisting paint, a paint for rusted chain link fences, and a utility aluminum paint. The Skybryte Co.

145 Protective Coating—This folder discusses a coating for controlling water seepage and dampness above and below grade, outdoors or indoors, on brick, concrete, cement plaster, stucco and concrete masonry units. Tells how coating works to protect surfaces, cites test results and describes in detail two transparent types and one light-fast coating. Gives answers to questions generally asked about such coatings. Prufcoat Laboratories, Inc.

CLEANING EQUIPMENT

146 Heavy-Duty Cleaning Equipment—Publication 22-46 tells how maintenance costs in all types of industrial and commercial plants can be reduced by use of efficient cleaning equipment. Describes, illustrates and gives specifications for several models of vacuum cleaners for wet and dry pickup, furnace and boiler cleaners, blowers, and other cleaning tools and accessories. Appliance and Merchandise Div., General Electric Co.

147 Vacuum Blasting — The efficiency and economy of company's vacuum blasting equipment for cleaning of equipment and other maintenance jobs, weld preparation, and conveying of granular material is presented by photo and description in this bulletin. Covers blast gun and accessories, conveying equipment. A large flow chart illustrates operation of a complete vacuum blasting unit-gun, generator, separator, dust collector. Vacu Blast Co., Inc.

148 Vacuum Cleaner—A heavy-duty industrial vacuum cleaner for use where large volume of wet or dry material is to be recovered before dumping is described in illustrated Form 134. Explains the unit's value in cleaning machine tools and castings, recovering coolant from sump tanks and large area work. Gives specifications, operating data. Doyle Vacuum Cleaner Co.

149 Floor Machines—Folder 4QD illustrates and describes four models of machines for floor maintenance, giving recommendations for their use, and stressing advantages of their offset motor feature and handle switch design. Also presents standard attachments for these machines. The Kent Co., Inc.

150 Steam Cleaners—Special advantages and general specifications of manufacturer's steam cleaners intended especially for continuous operation and for fleet cleaning of trucks and heavy equipment are contained in Bulletin 40. Illustrated with photos of assembly, inner workings, cleaners in use, and dimensional drawings. Malsbury Mfg. Co.

151 Heavy Duty Cleaner—Form A-752 describes and illustrates working principle and advantages of a portable industrial cleaning unit with 3 hp motor and 4 cu ft dust storage capacity. Cutaway illustration shows how unit is built. United States Hoffman Machinery Corp.

FLOORING, FLOOR PREPARATIONS

152 Industrial Flooring—Eight major advantages of company's greaseproof flooring are discussed in this bulletin. Also provides full specifications and illustrates, in color, 13 patterns available. Includes photos of several installations. The Tile-Tex Div., The Flintkote Co.

153 Cement Floors—The importance of quality concrete floors and the factors involved are explained in this bulletin. Includes step-by-step illustrated instructions for installing a floor of this type and discusses merits of company's cement flooring, listing some prominent users. Kalman Floor Co., Inc.

154 Floor Plate—This information booklet on rolled steel floor plate is illustrated with actual-size blue prints and photos of plate details. Includes table of weights and sizes, tells some of the uses of steel floor plate and its special advantages. Alan Wood Steel Co.

155 Concrete Hardener — Bulletin BP 1008 describes a liquid hardener for making concrete floors wearproof and dustproof, which is also applicable for terrazo floors and other concrete surfaces. Explains how this hardener works, how it is applied, and coverage. Discusses protection afforded by the hardener, its economy and other advantages, giving test data. L. Sonneborn Sons, Inc.

156 Oil Absorbent—Folder 623-4711 tells advantages and uses of a non-inflammable floor preparation for drying up water soluble lubricants, coolants, grinding and drawing compounds, soap solutions. Stresses safety afforded to foot and truck traffic by its use. The Diversey Corp.

157 Floor Finish—A quick-drying finish for wood floors, described as ready for traffic in 30 min, is described in this folder. Tells merits of the finish and how to apply it. Includes full color photos showing how various shades of this finish look on different woods. L. Sonneborn Sons, Inc.

AIR CLEANING, DUST CONTROL

158 Electrostatic Precipitation—Bulletin GEA-3212, profusely illustrated with photos and diagrams, explains how electrostatic precipitation works, gives case histories of seven typical installations where the system is being used, and describes the various methods of electrostatic precipitation and the electric equipment applicable to each method. Discusses air cleaning, gas cleaning, and recovery, other applications. General Electric Co.

159 Dust Collectors—Illustrated Bulletin 172 is an industry report on the use of company's dust collectors in the manufacture of paint. Tells the story of better working conditions, improved efficiency, better quality control and recovery of useful material brought about by eliminating dust in the mixing and handling of dry pigment and organic dyes. Also describes and illustrates dust collectors, explains their advantages. American Wheelabrator & Equipment Corp.

160 Tubular Dust Collectors—Manufacturer's single-aperture and two-inlet type tubular dust collectors, their design and operation and applications are explained and illustrated in Catalog 2506. Also illustrates basic horisontal and vertical arrangements for both types and includes standard dimensions and engineering data helpful in selecting dust collectors, and presents general discussion of the fly ash problem. Frat-Daniel Corp.

161 Dust Control—How a plant engineer can initiate many savings stemming from dust control by a simple "wet water" arrangement involving no capital investment is the story told in this folder. Explains how this chemical wetting process works and cites its use in cotton mills, steel plants, concrete mixing. Describes and illustrates necessary equipment. Aquadyne Corp.

BUILDING AND GROUNDS

162 Filtered Daylight—Booklet BRA 3-0749 PSR explains how the filtering of sun's rays by means of windows and skylights made of a special heat-excluding glass can provide better light and increased comfort and other benefits. Illustrated with photos of several installations, it includes suggestions on selecting the proper type of this glass for individual plant requirements. Blue Ridge Glass Corp., Libbey-Owens-Ford Glass Co.

163 Insulation Hardboard Design Data—Bulletin RHB-1-50 provides more than 20 pp of design data for proper application of a synthetic rubber insulation hardboard. Explains factors involved, determination of thickness of insulation required, prevention of condensation by insulation. Includes general information on the insulation, tables showing values of heat transmission coefficient for masonry walls, concrete floors and ceilings, and other technical information. Rubatex Div., Great American Industries, Inc.

164 Protection for that Roof—Illustrated Form 100-X tells the how and why of roof preservation. It describes causes for most roof troubles and explains tested methods to combat the havoc caused by roof structure movement, sun, wind, rain and snow.

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April, 1950
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PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

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City ..... State .....

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Also, use this card for more information on advertised products.

Also describes methods of eliminating frequent difficulties in vital areas such as flashings, laps, seams and coping stones. United Laboratories, Inc.

165 Phone Booths for Noisy Spots—Bulletin 194 provides photos of several of company's floor and wall model phone booths designed to permit telephone conversations in factories, utility plants, commercial buildings. Stresses advantages and versatility of the booths and describes and illustrates their construction. Includes specifications, prices. Burgess-Manning Co.

166 Wire Partitions and Gates—Catalog 50 describes and illustrates woven wire partitions, enclosure panels, window guards, collapsible folding gates, other gate units. Gives dimensions, ordering data. Includes photos of units and installations, and sketches of construction details, typical groupings of standard sections. Acorn Wire and Iron Works.

167 Small Scaffold—The merits of a small sized swinging scaffold for painting and other light-duty work are stressed in illustrated Bulletin C.P. 34. Explains safety features, tells how scaffold is used. The Patent Scaffolding Co., Inc.

168 Fire Hazard Index—This 36-pp pocket-sized booklet lists, in quick-reference alphabetical order, over 500 chemical, gas and common fire hazard materials. Specifies which type of fire-fighting agent to use on each, as recommended by the Board of Fire Underwriters and the National Fire Protection Association. Also contains basic facts about the principles of fire-fighting in illustrated form. Available to qualified plant engineers. Randolph Laboratories, Inc.

169 Ceiling Outlets—This is a data book on manufacturer's air discharge units for installation flush with ceiling. Fully illustrated, it discusses design details and operation of the outlets and adjustable air pattern afforded. Includes dimensional drawings, specifications and performance data on two models. Barber-Colman Co.

170 Line Marker—This bulletin stresses features of a line marker for painting traffic lines and illustrates its use. Includes simple instructions. Lasting Products Co.

INSTRUMENTS AND CONTROLS

171 Electronic Timer—The principles of operation and methods of application of an electronic millisecond timer are explained in Bulletin 1030. Also discusses and diagrams the instrument's control by keys and contacts, by changes in applied voltage and by photocells. Includes specifications. Herman H. Sticht Co., Inc.

172 Control Unit for Compressed Air Lines—This bulletin pictures and describes a three-part unit for cleaning, regulating and lubricating of compressed air systems. Discusses complete unit as well as purifier and lubricator. Airlube, Inc.

173 Zone Control—The automatic regulation of a heat supply for maximum economy, comfort and convenience to different areas of a structure in proportion to occupancy and exposure is discussed in Bulletin P-3718. Explains manufacturer's control systems and describes and illustrates some of the equipment incorporated in them. Barber-Colman Co.

WELDING

174 Low Temperature Welding—This 32-pp illustrated handbook is pocket size but lists all of company's rods and fluxes and contains tables of characteristics, full application information, and helpful hints. Among new products described are a general purpose steel electrode, a high alloy steel electrode, a phosphor bronze "A" electrode for arc welding and a line of brazing alloys. All-State Welding Alloys Co., Inc.

175 Contacts for Welding—Electrical contacts consisting of silver facing individually bonded to steel backing for projection welding to contact supports, are illustrated and described in Circular 501. Specifications for these contacts are included. Gibson Electric Co.

176 Resistance Welding—Illustrated Bulletin 136-A describes company's three-phase welding system intended to achieve balanced three-phase load at near unity power factor. Includes photos showing an installation, details of spot welds, specifications and illustrations of six types of welders. Sciaky Bros., Inc.

HOSE

177 Vacuum Hose—Industrial vacuum hose, which handles dust, abrasive scrap and toxic fumes, is pictured and described in Catalog Section 4780. Illustrates and explains construction of the various types available, lists recommended uses and gives specifications. The B. F. Goodrich Co.

178 General Purpose Hose—This 28-pp catalog covers air, steam, water and suction hose as well as hose for special applications. Illustrated with photos, it describes construction, uses of each type, gives sizes, weights, working pressures. Includes section on couplings, clamps; also handy reference tables. Republic Rubber Div., Lee Rubber & Tire Corp.

FEEDERS, DISPENSERS

179 Chlorine Dispensers—Chlorine dispensing equipment for use in direct-proportioning systems, high capacity systems, and gas injection systems is covered in Catalog 61, 12 pp. Explains and illustrates operation of dispensers, elaborating on design features. Fischer & Porter Co.

180 Chemical Feeder Data—Special features of company's automatic chemical feeders, their operating principles and standard specifications are presented in Part 2, Section 8 of Catalog 54. Book also describes and illustrates both a vertical and horizontal model. Black Sivalls & Bryson, Inc.

PROCESS HEATING

181 Infra-Red Ovens—Form 72-648 discusses advantages and economy of an infra-red oven for process heating applications. Describes and illustrates two models, gives specifications, cites performance records. Includes price list covering various models and lamping details. The Pastoria Pressed Steel Corp.

182 Electric Heating Units—Bulletin D49 shows many forms of open coil, tubular and cast-in electric heating units, giving sizes, available metals. Lists general advantages of these units and consulting services offered by company. Thermel, Inc.

MISCELLANEOUS

183 Micarta Data—Booklet B-3194-D is company's revised 36-pp data book on Micarta. Published as a working tool for designer and user of industrial materials, it presents clearly and completely the technical facts about Micarta. The grades and forms in which this industrial plastic is supplied are tabulated, together with chemical, mechanical and electrical properties of each. Standard shapes and sizes available are listed, and a description of finishes is included. Westinghouse Electric Corp.

184 Blasting Helmet—Bulletin 97 illustrates and discusses features of a helmet designed for sand and grit blasting. Includes specifications and instructions for use. The W. W. Sly Mfg. Co.

185 Modern pH and Chlorine Control—The new ninth edition of this 100-pp illustrated booklet has been revised to conform with the latest developments and most modern practice in water treatment. More than a catalog, it gives full technical details of all the color comparators and equipment for water testing and control of boiler and industrial process water manufactured by company. Its most important feature, however, is inclusion of technical information on the meaning of pH control, electrometric and colorimetric methods of determining pH and also determining constituents, impurities in water; applications of water control in air conditioning; treatment of boiler feed water and industrial water, and other industrial applications. Descriptions of color comparators are detailed and illustrated with the prices listed; and include a new testing set for total hardness of water. W. A. Taylor & Co.

186 Survey on Radioisotopes—Here is a general discussion of tracer and control work being done with radioisotopes today. Presents theories on isotopes, difference between stable and radioisotopes, properties of radioisotopes, principles of the tracer method, and radioisotopes in control applications. Survey covers use of radioisotopes in sciences and in industry and their use in industrial equipment. The Kollex Corp.

187 Traveling Water Screens—Illustrated with photos of installations and standard housings, Bulletin 50-36 stresses important features and construction details of company's traveling water screens for power plants, paper mills, and water treatment, chemical and industrial plants. Discusses factors important in selection of screens. Chain Belt Co.

188 Short Cuts for Those Who Type—Although written for stenographers, Booklet R7971E holds many a helpful hint for the plant engineer who sometimes uses a typewriter to put his ideas on paper. Tells what the various gadgets on a typewriter are for and how they can make the job easier. Includes pointers on using the tabulator, changing ribbons, corrections. Typewriter Div., Remington Rand, Inc.

189 Magnetic Holder—Bulletin 600 introduces a magnetic holder for test indicators, trouble lights and the like, giving its special advantages. It's illustrated with photos of holder in use and includes specifications and shipping weights and prices for three models. Enco Mfg. Co.

190 Assembly Bins—How company's individual bin units can be combined to suit plant's individual needs for jobs involving the assembly of small parts is pictured and discussed in this folder. Gives sizes, prices, shows typical set-ups for speeding up assemblies. Also describes and illustrates larger stacking units and racks for storage and transporting of parts. Stackbin Corp.

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Is Scrud a problem in your plant?

* *Scrud: the SCale, RUst, Dirt, water, oil and other foreign matter in pipe lines.*

● Scrud—a word coined to describe the damaging foreign matter nearly always present in pipe lines—can be eliminated completely. Staynew Pipe Line Filters are the answer.

These money and trouble-saving filters include many exclusive features that mean better performance at lower cost wherever pipe lines must deliver clean air, gases or liquids. Tools, machines and processes require less attention, operate more efficiently when Staynew Filter-protected. It is not unusual for a Staynew Filter to save its entire purchase price in a few days of use.

STAYNEW filters

...FOR AIR AND OTHER GASES

Model CPHS
Swing Bolt Head

DOUBLE ACTION PRINCIPLE GUARANTEES BOTH CLEAN AND DRY AIR OR GAS

Model CPH
Bolted Head

Deflector Cup "A" directs air or gas to walls of housing, thence to base where heavier particles and liquids are deposited. Air or gas then rises thru Radial Fin Insert "B" where lighter particles are removed.

Models for high pressure; also high temperature or corrosive gases.

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...FOR LIQUIDS

Model ELS
Small Capacity

Model ELS
Large Capacity

Wide variety of media available. Low first cost, also low maintenance due to Slip-On Insert which permits quick on-the-job change or replacement of medium. Models available for high temperature or corrosive liquids.

RADIAL FIN CONSTRUCTION PROVIDES:

★ Large active filtering area in small space, thus low resistance to flow.

★ Inserts easily removed for cleaning or replacement.

★ Superior wearing quality.

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DOLLINGER CORPORATION • 55 Centre Pk., Rochester 3, N.Y.

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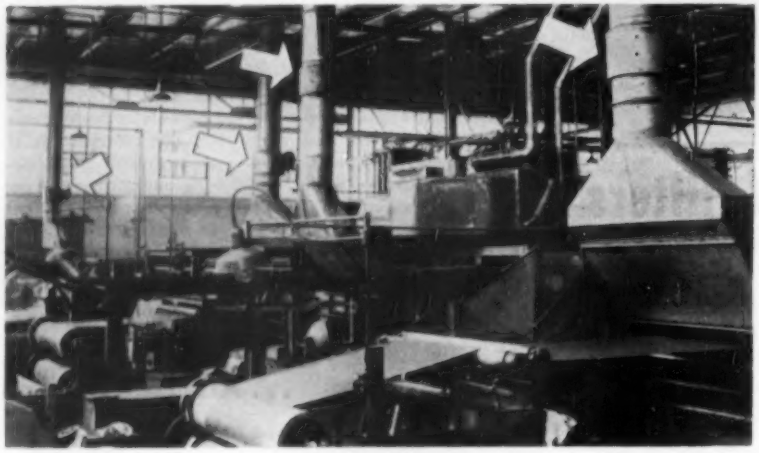
Have you an air-moving job which has never been *really* whipped? Or a new one which looks to be mighty tough? That's the kind we like! Frankly, such jobs are no fun for us . . . but when our equipment and our engineering help prove themselves up to the hilt, as they've done time after time, we've won a friend.

Want to move 50,000 CFM against 4" water gauge pressure? Sure we can do it . . . with a minimum of equipment and "cluttering-up", mighty low power consumption and long, trouble-free service.

Need better ventilation? Want to break up a hot-spot? Are there points of dust or fume concentration? Those are simple things to remedy, but to be *sure*, precisely the correct fan or blower, of the right size and type, should be specified. Don't just buy an oversize piece of equipment — buy the *right* size.



The photograph at the left shows Hartzell equipment installed at the Synthane Corporation, Oaks, Pennsylvania. Previous to the installation of Hartzell Belt-Drive Duct Fans, exhausting through the stacks shown, fumes and heat spread through the plant from the plastic coating machines in the photograph. The plant operator reports that both heat and fumes were completely eliminated by the installation, planned and specified by Hartzell.

When you write to us, or clip and mail the coupon below, you put the whole weight of Hartzell engineering, longest experienced in the propeller-type fan industry, to work on *your* air-moving problems. Application directly to your needs is handled by an experienced, competent Hartzell field office near you. Thus you get not only excellent air-moving equipment but also the widest performance experience available anywhere, applied to your plant by Hartzell men. For the tough or the simple job, do it *best* with Hartzell. Clip and mail the coupon now. There's not the slightest obligation.

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New Products and Methods

(Continued from page 83)

solenoid switch, connectors, terminals and special insulating tape. Available for most voltage, a-c or d-c. Recommended for use in fueling pits, bulk plant installations, docks, chemical plants, also for industrial fire hose, fire apparatus and foundries. Clifford B. Hannay & Son, Inc.

40—PLASTIC PIPE

Is lightweight, flexible; for wide industrial application

Recommended for transmission of processing fluids, chemicals, water, sewage, fumes and dust, Carlon Plastic Pipe is credited with permitting rapid and economical installation of piping systems. It is light in weight—a 100 ft section of 3 in. dia pipe weighs about 90 lb, manufacturer reports. Other features stressed are resistance to corrosion and durability. Manufacturer guarantees it against rot, rust and electrolytic corrosion and declares its tensile strength to be 1400 psi and flexural strength up to 1700 psi.

Said to be practically unbreakable, Carlon's impact at temperatures from -50 to 140 F is similar to that of soft rubber. Company points out that, like all plastics, Carlon is an insulator and will not form galvanic couples and thus offers increased service life.

Carlon can be curved from ceiling to wall or wall to floor, but fittings can be supplied to make right-angle bends and provide for T or Y connections. Fittings, with stainless steel clamps, come in standard pipe sizes from ½ to 6 in. Carter Products Corp.

41—AIR PUMP

For a wide range of suction and pressure applications

Class 23 Series Air Pumps are dry lubricated to eliminate discharge of oil vapors, a factor of importance in many operations such as handling paper, food products, pharmaceutical preparations. The displacement blades furnish their own lubrication and take up their own wear; they are designed to be consumed after a reasonable length of time in continuous, heavy service and replacement costs are said to compare favorably with maintenance of many other types of pumps.

These pumps are fan cooled. They're available with a double extended shaft for group installations driven by a single power source. Rotation is normally clockwise, but counter-clockwise rotation is available. While designed for operation at 1750 rpm, pumps are not restricted to this speed. Capacities range from 5 to 20 cfm for single units; larger capacities by group drive. The Kraissl Co.

42—LIGHT STEP LADDERS

For heavy service where one-man equipment is desired

Here's a fully riveted aluminum step ladder constructed with 0.064 in. thick 52S-H34 aluminum alloy. It's available in five standard sizes from 4 to 12 ft, with pail shelf on all but the 4 ft size. Ladders have heavy ridges on steps for non-skid footing and thick fibre insulating blocks on floor contact points. Hardware, including external braces, is cadmium steel. Louisville Metal Products Co., Inc.

43—CHEMICAL PROCESS

For electroplating all regularly used alloys on aluminum

The Alumetex Process is said to offer excellent corrosion resistance and adhesion by means of simple immersion treatments and affords complete elimination of blisters, pits and full deposits. It processes sand castings, die castings and wrought aluminum through the same cycle, according to company. Mac Dermid Inc.

44—PULLEY PULLER

Is heavy-duty, portable hydraulic type rated at 50 t pressure

Developed to supplement company's 5 t and 20 t pullers, the new model is especially designed to remove large pulleys, wheels, gears from shafts, and to handle jobs beyond capabilities of smaller units. It is described as rugged in construction, with heat treated alloy steel cross beam, puller arms and feet. Pressure exerted by the ram is regulated by a 3-speed hydraulic pump.

Though more than 600 lb in weight, puller can be moved and operated by one man, company states, and pulleys as large as 42 in. dia with face width to 48 in. can be handled. Priced at $595.000. Industrial Engineering Equipment Co.

45—ELECTRIC PLANT

Is portable unit featuring low fuel consumption

The Model 04AH is designed for applications needing a portable source of electric power. This 400 w, 60 cycle a-c generating plant will operate for 5 hr on 1 gal of gasoline, according to manufacturer. It is 19 in. long, 14¼ in. wide and 16¼ in. high.

The 4-cycle, air-cooled engine used as prime mover is built for heavy-duty electric plant service, company states, and extra-large bearings, sturdy rod and crankshaft and large crankcase are provided. All models have inherently regulated generators. Available in either portable manual or remote starting models. Manual plants are started by pull-rope. Supplied with current from a 12-v automotive type storage battery, remote starting models are electrically cranked with generator serving as motor. Extra start-stop buttons may be installed within 250 ft of unit. D. W. Onan & Sons Inc.

46—ELECTRONIC TRACER

For quickly locating defective point in wire, metal pipe

No technical knowledge is required to operate the Electracer, its manufacturer states, pointing out that it locates grounds, shorts, open circuits, radio interference, in wiring, conduit or piping in Diesel engines, electronic equipment, communications equipment and industrial machinery.

Tracer consists of a signal generator, portable probe, receiver and headphones. The signal generator follows a conductor, company explains, that may be imbedded in a wall, buried underground or lost in a maze of other pipes and wire. The generated signal is followed with the probe and amplified by the receiver, and heard in the headphones so the route of the conductor, point of defect or end of conductor can be quickly determined. Price is $96.50. Special Products Co.

47—OUTLET BOX COVER

Is also switch housing for ceiling or wall mounted boxes

Described as suitable for individual control of lights or power units and control of banks of lights up to 1250 v, the No. 109 Outlet Box Cover provides both cover and switch assembly. Of molded brown phenolic plastic, it has partially molded screw holes which can be punched for installation on 3 and 4 in. outlet boxes. Over-all diameter is 4¼ in. Designed for and equipped with company's No. 1010 Levolier switch, cover can be obtained without a switch as No. 109-X for use with other switches. The McGill Mfg. Co., Inc.

48—PROTECTIVE COATING

For weather-exposed services at temperatures up to 750 F

Silicone Coating Aluminum is formulated to withstand either continuous exposure to heat or intermittent heating and chilling, and all conditions of weather exposure, as well as chemical-fume attack. It is described as ideally suited for out-of-doors service in industrially contaminated atmospheres, as well as for exposure to atmosphere under shelter, and is recommended for stacks, furnaces, boilers, heaters, ovens, steam lines, gas burners, and exhaust mufflers.

Its fluid consistency and high spreading rate is intended to permit application by brush or spray to any reasonably well-prepared iron, steel, galvanized, or other metal surface, either new or in service. Recommended coverage is 1000 sq ft per gal. Drying time is ½ to 3 hr. The Dampney Co. of America.

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NEW TORNADO* FLOOR MACHINE

because it has exactly that proper balance and "feather touch" control which enables the operator to perform the toughest jobs quickly and easily . . . without fatigue.

This newly designed and scientifically engineered TORNADO* is ideal for all manufacturing plants:—scrubs both wet and dry; loosens and dislodges clinging substances from any type of floor; operates quietly, smoothly, with instant glide response in any direction at the will of the operator.

7 NEW EXCLUSIVE FEATURES

New TORNADO* features are functional operating advantages. All contribute to ease of operation, floor maintenance savings and operator satisfaction.

- Rotary Safety-Grip switch
- Finger-tip solution control
- Fully adjustable handle
- Self-raising wheels
- Automatic brush coupler
- "FOAM-FEED" brush back design
- Quick-Change Snap-On brush rings

All-Purpose Applications. With one TORNADO* you can scrub, wax, polish, buff, sand, steel wool or pumice any floor in any department or building of your plant. Remove stains. Reduce floor replacement and maintenance cost.

Write for The TORNADO* Floor Care Manual and Bulletin 583.

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HEAVY DUTY VACUUM CLEANING SYSTEMS

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AIR APPLIANCE DIVISION
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CANADIAN PLANT: NEWMARKET, ONT.

(Continued from page 62)

Fluid Drive "Unshocks" Barrel Elevator

THIS BARREL elevator at Rheem Mfg. Co., Richmond, Calif., has been supplied with an electrofluid drive. Barrels weighing from 35 to 50 lb., coming from the steam cleaning chamber, are rolled down an incline to a loading cradle from which the arms of the elevator lift them.

The shock of this pick-up has, in the past, resulted in trouble with the motor drive, frequent burning out of the motor and excessive wear of all moving parts including the elevator chains. Through the cushioning effect of an electrofluid drive installed last fall on two such elevators the entire operation has been smoothed out and former trouble eliminated, according to recent reports.

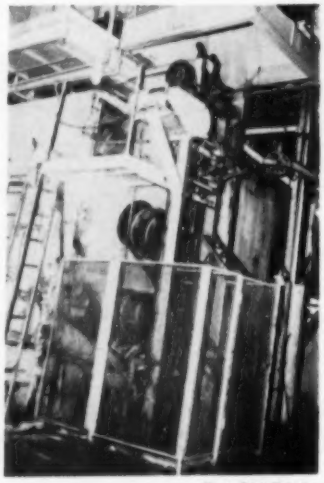

Photo: Link Belt Co.

Shown here is the new drive and the drying chamber into which the elevator automatically discharges the barrels on its "up" side

Rusty Threads and Difficult Conditions

Contributed by
Herbert Bouton

FOR PREVENTIVE maintenance reasons it was necessary to remove one of the gates from a large lock in the inland waterways and place it in drydock for thorough inspection, painting and possible repairs. The job might have been simple except for the difficult conditions encountered due to rusty threads.

A brief description of the installation will help to understand the problem. The lock was built to give 8 ft clearance over the sills and 46 ft lift from the lower river surface to that of the pool above. The gates were 110 ft long in the clear across the lock and were used to close the upper end of the lock

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On rough surfaces Fuller 100% Nylon Paint Brushes outwear all other types of brush materials.

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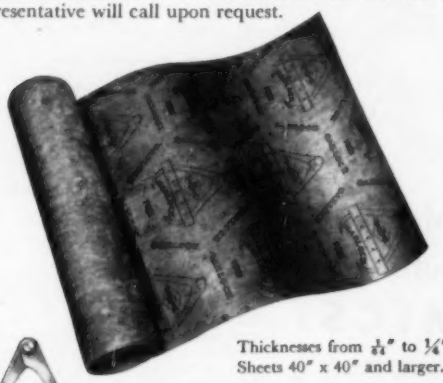

Thicknesses from $\frac{1}{64}$" to $\frac{1}{4}$". Sheets 40" x 40" and larger.

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PALMYRA, NEW YORK

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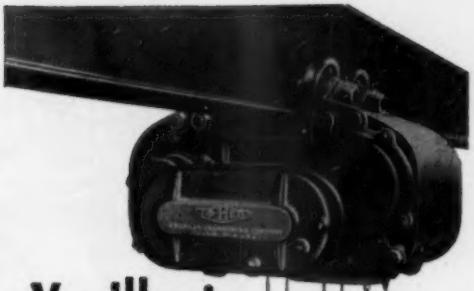
PACKINGS, GASKETS AND OIL SEALS



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LO-HED Hoists come in five suspension types and a range of capacities. Units can be engineered for individual needs. Mail coupon for full data.

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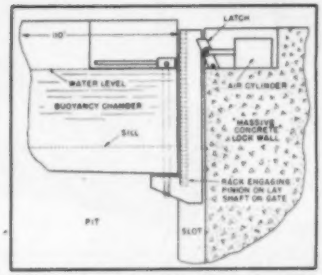
ATOMICS, 53 W. Jackson Blvd.
Chicago 4, Ill.

chamber. The two gates, one serving the lock while the other was held as a spare, were 10 ft wide up and down stream and 15 ft vertically.

The gate was held in line horizontally by projections on each of the gate ends (see sketch). The upper one was made fast to the gate. The lower one, part of a frame running up and down within the slots of the side walls of the lock, was bolted to the bottom of the main gate frame by means of a square threaded bolt of steel. This bolt of steel was about 4 in. in diameter and some 10 ft long so that special round heads with tapered round holes could be used and which would accept bars for manipulating them when the gate was at its upper position.

In this particular situation the gate had not been in drydock for several years and, as a result, the steel threads of the bolts were heavily encrusted with barnacles or warts of rust. The pit in which the men had to work to unscrew the bolts was only 4 ft high



Sketch of gate installation for waterway lock. The frame slides vertically in slot. Bolt locks it solidly to gate when set. The frame remains in slot when bolt in disengaged, allowing gate to be towed away to drydock

and about 6 by 6 ft horizontally. Its bottom was only 2 in. above the still surface of the upper pool, and when the wind blew down over four miles of mile-wide river, the wave action was considerable.

The bolt heads were so situated that the only way to get a good pull was for the men to sit flat on the floor or, at best, on a very low stool. The bolts were difficult to break loose and soon stalled completely.

To get more power, a set of triple blocks was attached at the extreme end of the longest bar usable—this rig stalled. Then a pair of double blocks was attached to the pull rope of the triples—the bar broke off. The job finally resolved itself into procuring the very best tool steel for the bar, tempered to get the greatest strength possible. A set of two rope blocks in tandem set-up were used and pulled until the thread stalled or maximum travel was reached. Then both falls had to be rehitched in the opposite direction and the pull reversed until the thread eased up. This operation was repeated, first one way and then the other.

This tedious job soon got on everyone's nerves. Finally in desperation, and against the wishes of the boss, emery dust was poured down along the bolt in the hope that some would find its way into the nut and so help in the scouring action. This worked out rather well—perhaps the dilution and partial lubrication of the water kept trouble from developing. The nut finally came free of the bolt.

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All-steel body eliminates excess weight, permits heavier loads per truck.

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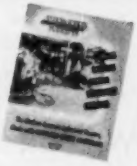

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File Resharpening

(Continued from page 39)

files in a cleaning solution. This is followed by immersing in one of several types of acid. The time of immersion varies with the type of acid, type of file, and amount of wear on the file.

The limitations of acid resharpening are very similar to sandblasting, as the acid changes the shape of the teeth. Generally the acid resharpening gives a keener-feeling file than the sandblast resharpening, but the file life is generally not as good due to the large changes in tooth structure. File manufacturers in general do not use acid as a sharpening agent in the production of files.

Acid resharpening has been tried by many industrial concerns but its continued use is extremely limited because it does not restore cutting life. In a few types of filing where continued keenness is needed rather than long life, acid resharpening has been used with success. However, this restricted types of application together with the hazards of working with acid makes the process one that is used even less than sandblasting.

Conclusions—Because of the price differential over new files, recut and resharpened files appear to be an attractive investment. The experience of our company in its own Research Department tests and the experience of file users throughout the country has been that reconditioned files are economically feasible in only a very small number of applications. This experience indicates that anyone interested in testing reconditioned files should watch the labor costs as well as file costs.

Industrial Wastes

(Continued from page 47)

nearly every colliery practices the recovery of the fine coal particles previously discharged, forming either briquettes or selling the fine coal as powdered fuel. In iron ore mining, considerable iron is left in the tailings, and this can be recovered and reprocessed for iron removal. The fermentation industry lends itself to by-product recovery better than any other industry today. Many distilleries receive large returns from the production of cattle feed. Probably the Hiram Walker installation is the most commonly known; by proper evaporation of the liquid from the distillery slop recovered here, high vitamin content feeds are produced which bring a premium price.

In most cases, the textile industry has very little possibility for recovery. Where wool is scoured, however, it is possible to recover wool grease profitably. Rendering plants, just as the parent meat packing plants, can recover grease from their wastes. In many instances, as high as ten to fifteen per cent of the total grease available at the plant is lost down the sewers. This can be recovered by efficient and properly operated and cleaned grease traps. Gas manufacturing plants producing coal tar by-products, can many times recover additional products which are now lost. The worst waste from gas manufacturing plants is usually the phenolic wastes. When phenols are present in high enough concentrations, phenol can be recovered for resale by several patented processes. When the phenols are present in low concentrations no recovery is economically sound.

It is apparent that many industries do not show any financial return from the standpoint of by-product recovery. Investigating the industrial waste problem however, in many cases it is possible to improve the quality of the product by changing the present method of manufacturing to reduce the waste volume. This then should be credited towards waste treatment, since additional revenue can be obtained from the improved quality of product. Not to be overlooked again is the public relation aspect in industrial waste treatment. When small streams, lakes, etc., previously used for recreational purposes, are badly polluted by industrial wastes, little love is held by the community for the industry creating the nuisance.

Tough Maintenance

(Continued from page 41)

break contacts require no shunts and are operated by the direct vertical thrust of the a-c solenoid. There is no mechanical connection between the operating bar of the contactor and the magnet. The latter is a self-contained unit providing its own bearings for the plunger, while the contactor operating bar and associated parts are independently guided by separate means. This construction eliminates all possibility of misalignment between the contactor and the operating magnet, reducing both mechanical wear and the number of working parts to an absolute minimum.

For all practical purposes, the electrical contact inserts can be considered as the only wearing parts in the device. Beyond mechanical considerations, the required dielectric strength is an important space factor in high voltage air break equipment. Here the use of specially designed arc shunts for high interrupting capacity and of insulating barriers for effective phase insulation, in addition to standard allowance for electrical creepages, helped, further, to limit the size of the unit, without affecting its ability to meet all of the standard electrical requirements for devices of its type and capacity.

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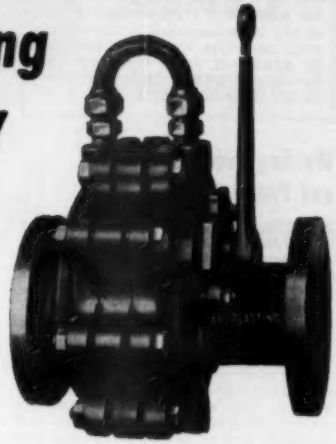

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New Books for Plant Engineers

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Welding Procedure and Practice

ELECTRIC ARC WELDING, Procedure and Practice. Size 5½ by 8 in.; 544 pp including index; flexible leather binding. Published by Hobart Trade School, Box EW-146, Troy, Ohio. Price $3.00.

IN THIS BOOK, the Hobart Trade School has made available a comprehensive and practical textbook on the procedure and practice of arc welding. This work is of outstanding value not only for the student, but also for the practicing welding engineer, welding operator and designer, as well as for executives and supervisors interested in welding procedure and practice.

The 28 chapters are divided in five parts: Part 1 discusses the development of electric arc welding, describes applications, available metals and alloys, joints and welds, electrodes, equipment and other basic procedures; Part 2 constitutes a complete self-study course, incorporating review summaries, practical exercises and quiz questions; Part 3 describes in detail the principles and practical operations of carbon arc welding; Part 4 covers other welding processes such as inert-gas-shielded arc welding, submerged arc welding, and electric stud welding; Part 5 reproduces the welding terms and their definitions of the American Welding Society.

The textbook is illustrated with over 600 photographs of operations, diagrams and charts.

Thermodynamics and Heat Transfer*

ELEMENTS OF THERMODYNAMICS AND HEAT TRANSFER by Edward F. Obert. First edition; size 6 by 9 in.; illustrated; cloth bound. Published by McGraw-Hill Book Co. Price $4.50.

DESIGNED PRIMARILY as a textbook for the undergraduate course on thermodynamics and heat transfer for students of engineering, this book nevertheless should prove most interesting and useful to practicing engineers.

The author begins by presenting first the definitions that form the foundation of the subject and from this foundation arises the First Law, the principle of reversibility and then the Second Law. Upon this framework, the author has based the secondary phases; properties of real fluids; characteristics of real gases; and the concept of the perfect gas.

The book is well illustrated with diagrams and sketches. Problems to be worked out are presented at the end of each chapter. Steam and various vapor tables of properties are included, and a number of folded charts in the back of the book show temperature, entropy, enthalpy and pressure relations for carbon dioxide, methyl chloride and the like, also a practical size Mollier Diagram.

Calculate Heat Flow by the Numbers*

NUMERICAL ANALYSIS OF HEAT FLOW by G. M. Dusinberre. Size 6 by 9 in.; 226 pp; illustrated; cloth bound; first edition. Published by McGraw-Hill Book Co. Price $4.50.

THE AUTHOR of this book, Professor of Mechanical Engineering at The Pennsylvania State College, explains that it is not adapted to casual reading. The book is presented as a "tool" that will require some study and practice before it is useful to the owner, but having once mastered it the reader will find it is useful in many fields of engineering and physics.

The subjects treated are: thermal properties, elementary combinations and analytical solutions. Then the author takes up steady state, physical subdivisions, some alternative methods, a multidimensional system and steady state geometrical systems, one dimension. This is followed by a discussion of two-dimensional square networks, two-dimension networks other than square, transient flow, variable properties and so on.

It is important to emphasize that this book is talking about actual practical problems in such things as heating of

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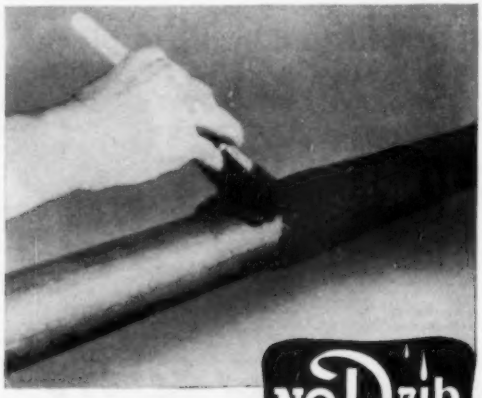

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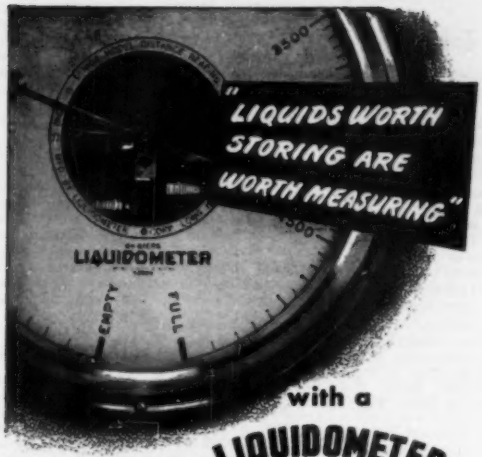

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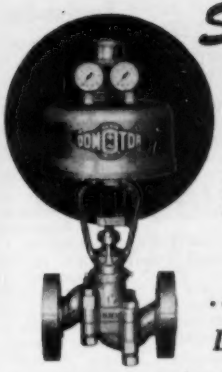

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Oil Engine Power Cost

Report on Oil Engine Power Cost for 1948, by the ASME. Size 8½ by 11 in.; 44 pp; illustrated; paper bound. Published by the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. Price $2.50 (20 per cent discount to ASME members).

THIS REPORT, like its predecessor, presents information on performance and production costs of oil-engine power plants. The report includes information from 124 oil engine generating plants.

The book is divided into three main sections, tabular in form. Table I gives information on production costs; Table II shows comparative cost for the years from 1929 to 1948; and Table III tabulates engine details and operating information.

An asterisk (*) following the title of any book described in this department indicates that the book may be purchased from the Book Department, PLANT ENGINEERING, 53 W. Jackson Blvd., Chicago 4, Ill.

Dictionary for English-Spanish Engineers*

ENGINEERS' DICTIONARY, Spanish-English and English-Spanish, by L. A. Robb. Size 5½ by 8½ in.; 664 pp; cloth bound. Published by John Wiley & Sons, Inc. Price $12.50.

THE OBJECTIVE of this dictionary is to give the North American technical man the accepted engineering terminology of Spanish America and vice versa. This is the second edition of a work issued originally in 1943, and has now been expanded to cover electrical and mechanical engineering more thoroughly, to bring all branches of civil engineering up to date, and include important terms in mining, shipbuilding, logging and several other fields.

This book should prove very helpful to those engineers who need to translate numerous technical terms from Spanish into English or from English into Spanish.

Standard for Gaging Bearings

Gaging Practices for Ball and Roller Bearings B3.4-1950. Size 8½ by 11 in.; 8 pp; illustrated; paper cover. Published by American Standards Association, Inc., 70 E. 45th Street, New York 17, New York. Price 50 cents.

THIS PAMPHLET sets down the American standard on gaging practices for ball and roller bearings. In general, the standard specifies the the most acceptable methods of determining whether bearings conform to specified dimensions. It thus provides means for bearing users, manufacturers, engineers, inspectors, and shop personnel to "talk the same language." This permits economies to both producer and user of bearings by eliminating differences of opinion arising from differences in gaging methods.

Specifically, the standard defines inspection methods, giving gaging loads and methods of measurement. Standard methods are given for obtaining dimensions of inner and outer rings, parallelism of sides, eccentricity, groove parallelism with sides, and other significant measurements. It also prescribes methods of measuring internal fit and tolerances for side run-out of lock nuts.

How to Use Tools

USE OF TOOLS, prepared by Standards and Curriculum Div., Training, Bureau of Naval Personnel, U. S. Navy. Size 5 by 8 in.; 258 pp; illustrated; paper bound. Obtainable from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 65 cents.

THIS BOOK was prepared as a basic reference for those enlisted men of the Navy whose duties require them to use tools to keep Navy gear and equipment in shipshape condition. It covers hand tools and small power tools but not machine tools.

The book begins with advice on the use of general purpose tools as hammers, screwdrivers, pliers, punches and wrenches. It explains the use of the

(Continued on page 102)

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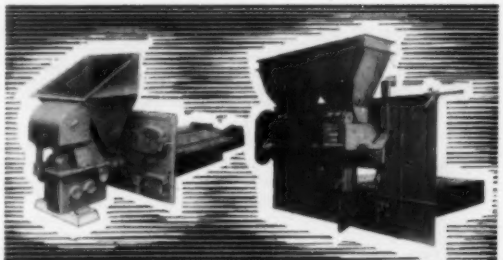

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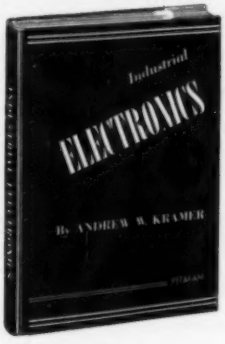

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by Andrew W. Kramer,
Editor, Power Generation

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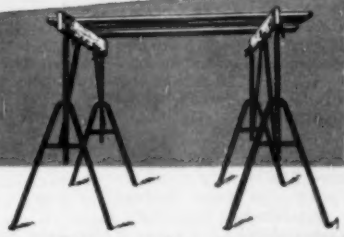

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Safety Code for Manlifts, ASA A90.1-1949. Size 5 by 7½ in.; 20 pp; paper bound. Published by the American Standards Association, 70 E. 45th St., New York 17, N. Y. Price 55 cents.

THIS NEW code is a consensus of the experience of manufacturers, users, insurance groups, enforcement officials, and independent specialists. The code was developed as a guide for state and municipal authorities in drafting regulations for the use of manlifts, where their use is now permitted. It is also intended as a standard reference on safety requirements for manufacturers, architects, plant designers and users.

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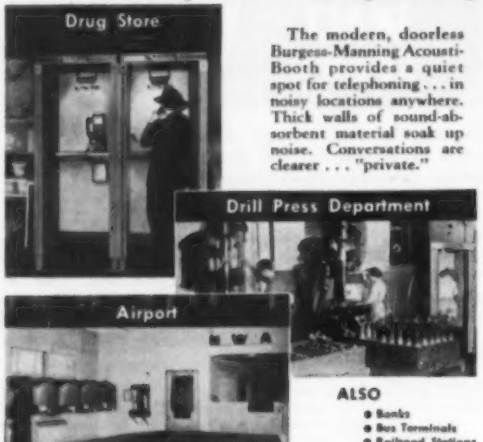

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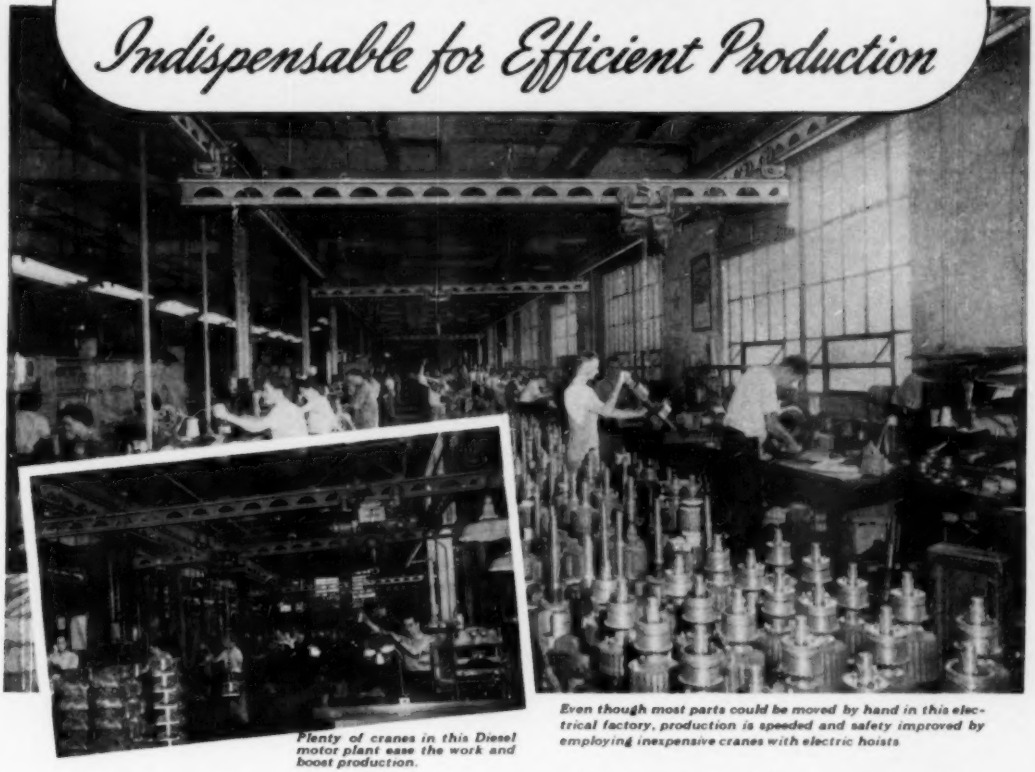

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